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November 1976

BUREAU OF MINES AND GEOLOGY

S. L. Groff, Director and
State Geologist

REPORT TO THE 1977 LEGISLATURE

ENERGY SUPPLY AND COST TRENDS FOR MONTANA

Written and compiled by

S. L. Groff

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Montana College of Mineral Science and Technology
Butte, Montana

ENERGY SUPPLY AND COST TRENDS FOR MONTANA

FOREWORD

This brief report was prepared for the 1977 Legislature at the request of State Senators Stan Stephens and Gordon McOmber. Its basic intent is to show that an energy problem exists, that this problem could develop into a crisis, that energy costs will continue the upward trend, and the solution of the energy problem will be difficult.

ACKNOWLEDGMENTS

Senators Stephens and McOmber are acknowledged and commended for their recognition and understanding of the energy problem and for requesting this report. Mr. William Opitz, Administrator, Utility Division, Montana Department of Public Service Regulation, is recognized for his discussions with the State Geologist and his contributions to this report. Other acknowledgments are listed at the end of the report.

ENERGY SUPPLY AND COST TRENDS

This report is brief and to the point. It departs from the conventional mode of presentation; a question-and-answer sequence is used throughout. Correspondence and papers received in answer to inquiries are presented in an appendix.

Why was this brief report prepared?

Senators Stan Stephens and Gordon McOmber believe that there is a definite need for an understanding of the pressures behind the trend of increasing cost for energy. They requested that such a report be prepared.

Is there a conflict with other reports?

No! It is understood that other agencies will be releasing energy reports. The EQC Staff Report, "Montana's Natural Gas Supply Crisis", by Thomas W. Frizzel, has been scanned and is recommended for reading by all Legislators. A part of the Montana Energy Advisory Council's work, "Undiscovered Natural Gas Resources of Montana", by Dr. Maher Ibrahim, was read and will be discussed

This report is short and specific and is concerned only with energy supply and cost trends and opinions thereon.

Are ENERGY costs increasing?

Yes! And they will continue to increase until energy supply and demand can be stabilized, and stabilization is not foreseen in the near future.

Why is this?

Basically because the United States now uses more energy than it produces and is dependent on foreign sources. The Oil Producing and Exporting Countries (OPEC) have a virtual monopoly on foreign supplies and are in a position to demand more for their product. In Montana we import oil and gas from Canada, and the Canadian Energy Board intends to retain adequate reserves of oil and gas for their own use, as well as to raise their export price to remain essentially in line with OPEC. This isn't all, however, for the cost of exploration, development, production, and delivery of oil, gas, uranium, and even coal has increased rapidly. Some of the least understood factors are the cost increases resulting from taxation and from the required compliance with an imposing array of federal and state statutes, rules, and regulations. Montanans and, for that matter, Americans, must understand that the taxpayer and the consumer must pay for the services and protection provided by government.

Does this report deal with specifics as to ENERGY prices?

No! Some opinions are given, but it is not the State Geologist's job or intent to attempt to project prices. Basically, the interaction of supply and demand and the decisions of regulatory agencies determine prices.

Does Montana have an ENERGY problem?

Definitely! We are getting by at this time, but costs are rising and will continue to rise. The consumer has felt the initial impact and will feel it worse in the future. There has been no energy shortage of consequence, but shortages are expected, especially in oil and gas and petroleum products. Part of the problem results from bureaucratic lack of perception that Montana's vast coal resources could and should be utilized to conserve and stretch out oil and gas supplies.

Is there more on Montana's ENERGY problem?

Yes! Canadian pricing to Montana could have been lower (see Opitz' letter and attachments, Appendix, p. 1-27). It is noted that Canada's principal energy resource is oil and gas, whereas Montana's is coal. It is probable that both Montana and Canada would be ahead in the long run if the Canadian price formula had been based on alternative energy forms rather than OPEC prices. (See Crowe correspondence, Appendix, p. 28-35.)

What about an ENERGY CRISIS?

There is no energy crisis in Montana now, although a crisis may be impending. A crisis could be avoided, however, by concerted and wise action of the state and national governments to conserve existing energy supplies and to develop new supplies, sources, or forms of energy. At this time there is no real state or national energy policy, no real effort to conserve energy, and no real concerted effort in Montana to develop new energy supplies in time to be effective.

Why are letters and material from foreign, federal, and state agencies, and utilities included in the appendix?

There is no better way of getting undiluted facts and opinions than from the experts involved in everyday confrontation with the problems. The correspondence and materials are well worth reading, and the facts and ideas merit consideration. Only the brief cover letter from the FPC is included (Appendix, p. 36), because Opinion No. 770* dealing with the price increase of natural gas is much too bulky to add to this report. The significance of the Opinion is the fact that the FPC felt compelled to raise the price—and (contested or not) there will be other price increases. In studying the FEA-Tuthill letter (Appendix, p. 37-39), the reader must bear in mind that p. 39 is in 1975 dollars and that some experts are estimating that imported oil may go to \$24 a barrel in the 80's.

Can Montana develop significant or adequate new supplies of oil and gas?

The State Geologist's opinion is that significant new supplies can be developed but that discovery of supplies adequate for all uses will be difficult. Dr. Maher Ibrahim, in his July 15, 1976, report to the Montana Energy Advisory Council (MEAC), has the following conclusions:

- (1) The amount of recoverable natural gas reserves and resources of Montana are in the range of 3-7 trillion cubic feet.
- (2) The reserves and resources of natural gas in Montana would be sufficient if developed to provide local consumption in the range of 37-87 years at the level 1974 rate of consumption.
- (3) Development of the above resources could guarantee Montana natural gas self-sufficiency at least for the next twenty years.
- (4) The present trend of de-regulation of natural gas prices and leasing in the speculative areas would put the natural gas industry in Montana in a position to increase gas production and alleviate shortages.

The State Geologist was pleased to be able to provide some assistance to Dr. Ibrahim and his committee. It is worth noting that the committee placed their highest estimates for gas potential in the Montana Folded Belt. The State Geologist likewise believes that the greatest potential for new

*Questions on the significance of FPC Orders and Opinions should be addressed to the Public Service Commission.

production is in this belt, which extends from the Canadian border south in and along the mountain front to spread west into Beaverhead County and east to the Bighorn basin. (Dr. Ibrahim discusses the belt in his report, which should be available from MEAC on request of Legislators.) Cost is a major impediment, however. Mr. D. J. Kull (Appendix, p. 40) cites \$1,700,000 as the cost of the 15,000-foot CENEX exploration well in Beaverhead County. Considering this cost and the geologically more complex situation in the northern part of the belt, Kull estimates that similar wells there could cost twice as much and might accomplish less. The State Geologist agrees, and further points out that the cost of finding and developing oil and gas is likely to be almost prohibitive in certain areas that have the greatest potential.

The whole point of the foregoing paragraph is that potential resources are not proved reserves until found and developed. The cost of new oil and gas, if found in commercial quantities, will necessarily be much higher than at present. Thus, caution is in order, for there is no guarantee that new reserves will be developed, and even if they are found and developed (and we certainly hope that they will be), prices will continue to rise (the greater the need—the higher the value—the greater the effort to find and produce).

It is obvious that the opportunity to find and produce much-needed oil and gas from geologically favorable situations should be encouraged in every practical manner. Regardless of increased cost, new supplies of natural oil and gas will probably be less expensive than synthetic equivalents. Nevertheless, if Montana is to develop new supplies, the state must provide a more attractive risk climate. Necessary exploration may well be diverted to other states because of high taxes and opposition to development here. It is important (to repeat what was said before) that the consumer realize that oil and gas exploration, development, and production costs are rising and will be reflected in the final price of the energy commodity (and all commodities using energy for their production).

Is there anything else on oil and gas?

There is some argument about whose figures on oil and gas reserves are more nearly correct—the petroleum industry's or the U. S. Geological Survey. An article in the November 1976 Reader's Digest, "Is There *Really* a Shortage of Natural Gas?" highlights the controversy. The State Geologist accepts the U. S. Geological Survey figures on the basis that the Survey has more extensive data. The argument may well be over apples and oranges, however, for regardless of the differing estimates, the fact is that a shortage of natural gas is inevitable. Instead of trying to settle the argument, we must forget it, and get at the business of finding and developing new supplies. Arguments about the subject are probably amusing to the OPEC nations, who are getting ready to raise prices again.

What about coal?

Montana has vast reserves of relatively low-cost coal. This plentiful fuel should be utilized in every practical manner, and planning for such use should already have been completed. Coal is a reliable fuel, and its use helps to conserve the dwindling supplies of oil and gas.

Direct burning of coal for heat energy is the most economical solution to the energy problem. In time, coal will be converted to clean-burning synthetic gas and liquid, but development is lagging, and costs of conversion are increasing. Conversion methods all involve significant energy losses, which result in fewer Btu's at the point of use. It is becoming evident that probably the greatest energy need is to develop clean-burning furnaces and boilers for raw coal fuel. Kissner (Appendix, p. 41-42) indicates that synthetic gas might be produced for as low as \$2.75 per Mcf* in terms of 1976 dollars. This is a fair

*Mcf one thousand cubic ft. or one million Btu as used in this report.

indicator, although restricted reports indicate a higher figure. The problem here is that ERDA has not perfected the lower-cost gasification system to a commercial scale, and cannot for several years yet. There is reason to believe that the best technology could produce high-quality syngas from coal at a cost range of \$5.50 to \$7.50 per Mcf by about 1985. In contrast, a ton of 10,000 Btu coal at \$30 per ton in Helena works out to \$1.50 per million Btu.

Electricity

Electricity is the cleanest and most efficient form of energy at the point of use. Correspondence from public* and private utilities (Appendix, p. 43-63) indicates an approaching shortage of generating capacity. Additional generating plants will have to come on line, for whatever the energy source—hydro, nuclear, or coal—electricity has become the common denominator of the American society.

It may be repeated here that the cost of electricity will include the rising costs of fuel, construction, equipment, taxes, and compliance with state and federal statutes, rules, and regulations.

In a cold consideration of the future, it is believed that Montana Power Company (Appendix, p. 51-52) has underestimated new loads in their service area. No criticism is implied, for the new loads foreseen result from a unique combination of events and situations. It probably will become necessary to produce and process certain mineral commodities in Montana as a result of OPEC-like pricing by foreign suppliers. We may need to utilize domestic resources to ensure the strategic future of the nation. Now, should this eventuality occur (and odds are that it will), then the western half of Montana may be short by a thousand megawatts or so in the relatively near future.

Nuclear ENERGY?

Nuclear energy has promise and is safe, contrary to many who oppose it. The limitation on fission reactors is the amount of uranium available. The breeder reactor gets around this by breeding additional fuel, but the nation is still years behind in developing the reactor. Public opposition has delayed the construction of fission plants and opposes the breeder system.

Nuclear plants are not necessary in Montana at this time, and are not expected unless some new and unforeseen technology is developed to make nuclear energy cheaper than coal energy. Nevertheless Montana could not afford to close off its options for nuclear power installation because of current arguments.

The ultimate—fusion ENERGY?

Fusion energy is the dream of many scientists and engineers. It is the energy hope of the world, for fusion is efficient and self-contained and uses the tritium and deuterium of sea water as fuel. Nevertheless, temperatures as hot as the interior of the sun are involved, and development of the basic systems for fusion power generation are not expected before the beginning of the next century.

Alternative (renewable) ENERGY sources

The prospects for wide-scale development of solar, wind, and geothermal power are not particularly good. All types of energy sources are needed, but some will add up only to the proverbial "drop in the bucket" when matched against total need. The point to be made here is that it would be foolish to depend on solar, wind, and geothermal energy to solve all our problems now or in the near future.

*Enclosures 2 and 3, referred to in the B.P.A. letter, p. 45, were omitted from the Appendix because of the size of the sheets.

Hydropower could be expanded in Montana and it is reasonably reliable, efficient, and environmentally pleasing. Yet there is opposition to every dam, and good sites are scarce. Hydro would not produce enough additional power to meet all the future energy requirements of Montana, but it would help.

Many people believe that wood and waste could be burned for heat and power. That is true in some places and on a reasonable scale, but there is simply no way that wood could meet the energy demands of everyone. It just doesn't grow fast enough.

What is the mineral-agricultural-ENERGY relation?

There are only two essential *basic* industries and they are mining (minerals) and agriculture. In our modern society one cannot exist without the other. Petroleum supplies the fuel to keep the machinery moving in the most efficient food-producing system in the world. Agricultural equipment is made from metal, and the metal came from the mining of a mineral deposit. Most fertilizer is mined. Mining and agriculture are energy-intensive in America, and that is precisely why America has led the world in these areas for so long.

What would be the effect of a major ENERGY shortage in Montana?

It would be an economic disaster and possibly worse, depending on the extent of the shortage. Consider farming and transportation without diesel fuel! Heating without gas! Lack of employment! Picture a hospital without electricity! The reason for this question is to point out that energy is a vital part of all our lives. Consider the effects of the initial Arab embargo on prices, jobs, and new designs for automobiles. Then consider what another OPEC embargo might do—and what their increasing prices are doing.

Were recommendations requested as part of this report?

No! But the writer is inclined to cite a few opinions anyway.

Opinions on the ENERGY problem

1. We know too little about the import, export, reserves, storage, and use of natural gas. A natural gas statistician should be employed by the Montana Board of Oil and Gas Conservation, and a series of monthly reports should be started. It is difficult to plan anything without facts, and data on natural gas are not at all adequate.

The Board might also add another petroleum geologist, so that more effort could be directed at studying potentials and working with the Bureau of Mines and Geology.

2. The petroleum industry should have a state-provided incentive to come into Montana and explore for and produce new oil and gas. A break in property-tax classification would be worth consideration, but even greater incentives should be devised.

3. We have abundant coal, and it should be used. Central heating plants should be converted back to coal. Montana industries should be given some incentive to use coal instead of gas, furnace coal production in the Roundup area should be pushed, and rural homes might well consider coal as the most economical (if not the most convenient) fuel available.

The fact may as well be faced now, coal is going to be used. In fact, coal and uranium are really the only positively available fuels to supply the interim need between the phase-out of oil and gas and the coming of fusion or other hoped-for new source of energy.

Finally, Montana is going to need thermal (coal) generated energy in excess of Colstrip units 1, 2, 3, and 4. The state should review its position and move *soon* to cooperate with the private sector to construct another generating center or whatever is necessary to meet the needs of our citizens.

Conclusions

1. Energy costs are inevitably going to continue to move upward because the trend is a result of OPEC pricing and its effect on the world economy. Montana's energy costs are tied in to Canadian and OPEC pricing, and there is little we can do about it, except to increase production of our own energy materials and to practice conservation.
2. There is an energy problem.
3. An energy crisis may be around the corner.
4. Montana must move toward practical energy conservation and development of additional energy (fuel) sources.

OTHER ACKNOWLEDGMENTS

Appreciation for assistance provided is extended to the following:

Mr. Marshall A. Crowe, Chairman, National Energy Board of Canada

Dr. Samuel J. Tuthill, Assistant Administrator, Energy Conservation and Environment, U. S. Federal Energy Authority

Mr. Frederick W. Lawrence, Technical Director, National Gas Survey, Federal Power Commission

Mr. Robert L. McPhail, Regional Director, Upper Missouri Region, Bureau of Reclamation, U. S. Department of the Interior

Mr. Ray Foleen, Acting Administrator, Bonneville Power Administration

Mr. Charles A. Robinson, Jr., Deputy General Manager, National Rural Electric Coop Association

Mr. H. L. Helgeson, Manager, Flathead Electric Coop, Inc.

Mr. Joe McElwain, President, Montana Power Company

Mr. Roger A. Hofacker, Vice President, Engineering, Montana Power Company

Mr. Roger Billings, Montana Power Company

Mr. David M. Heskett, President, Montana-Dakota Utilities Company

Mr. J. Andrew Kissner, Energy Projects Manager, Montana Trade Commission

Mr. D. J. Kull, Manager, Exploration Development, CENEX

Dr. Maher Ibrahim, Assoc. Professor of Petroleum Engineering, Montana Tech

Mr. Thomas W. Frizzel, Environmental Quality Council

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APPENDIX

PUBLIC SERVICE COMMISSION 1227 11th Avenue • Helena, Montana 59601
Telephone: (406) 449-3007 or 449-3008

November 15, 1976

Gordon Bollinger, Chairman
P. J. Giffenher
Thomas Monahan
James R. Shen
George Turman

Mr. S. L. Groff
Director and State Geologist
Bureau of Mines and Geology
College of Mineral Science & Technology
Butte, Montana 59701

Dear Mr. Groff:

In response to your request for factual information concerning the trends of supply and cost for energy, the data set forth below are the most recent figures for Canadian natural gas supplied to The Montana Power Company system at two border points, namely, Carway and Aden.

SUPPLY

<u>Date</u>	<u>Carway</u>	<u>Aden</u>	<u>Total</u>
July 1974	29.2 BCF	20 BCF	49.2 BCF
May 14, 1975	29.2 BCF	10 BCF	39.2 BCF
May 14, 1976	29.2 BCF	5 BCF	34.2 BCF

PRICE

<u>Date</u>	<u>Carway</u>	<u>Aden</u>
January 1973	26¢/MCF	16¢/MCF
July 1, 1973	37¢/MCF	23¢/MCF
July 1, 1974	67¢/MCF	50¢/MCF
January 1, 1975	\$1.00/MMBTUs	\$1.00/MMBTUs
August 1, 1975	\$1.40/MMBTUs	\$1.40/MMBTUs
November 1, 1975	\$1.60/MMBTUs	\$1.60/MMBTUs
September 10, 1976	\$1.80/MMBTUs	\$1.80/MMBTUs
January 1, 1977	\$1.94/MMBTUs	\$1.94/MMBTUs

You will note that the supply cut has occurred at the Aden border crossing on May 14 of 1975 and 1976. The gas coming to Montana from Aden is a mixture of purchased gas, company owned gas, and fee gas. The mixture of the gas has historically been about one-third purchased, two-thirds produced and less than three percent fee gas. The gas coming into Montana at Carway is all purchased from Alberta and Southern Gas Company, Ltd., and is a high BTU gas, normally in the range of 1,060 BTUs/ft³. Aden gas is normally in the range of 940-960 BTUs/ft³. The BTU content is important because after January 1, 1975, all gas was priced per million BTUs rather than so much per MCF. This essentially raised the price of gas for Carway and lowered the price at Aden on a MCF basis.

Presently Montana Power Company (MPC) has received authorization from the Province of Alberta and the Canadian Energy Board to shift its take from Carway to Aden, so that up to 20 BCF can be brought into Montana from Aden with the remaining take made up from Carway. This will require delicate negotiations with Alberta and Southern to amend the present contract. Further, it is anticipated that the Canadian Energy Board may very well decrease the total take of Canadian gas from the present 34.2 BCF level to 29.2 BCF on May 14, 1977.

Thus, after May of 1977 the supply picture may quite possibly be 20 BCF imported at Aden and 9.2 BCF imported at Carway. The remainder of the gas supply to MPC's system comes from Montana purchased and Montana royalty gas.

Most of the gas supplied to the Montana-Dakota Utilities' (MDU) system is purchased in the states of Montana, North Dakota and Wyoming. Approximately 40 percent of MDU's Montana demand comes from Montana sources with the remainder coming primarily from Wyoming. As such, the gas purchased from producers is subject to the prices established by the Federal Power Commission (FPC). MDU's supply of gas is such that they have presented an industrial curtailment plan to the FPC which would reduce industrial consumption by 22 percent for the 1977 fiscal year, with future curtailment in subsequent years.

The prices MPC and MDU have paid for Montana produced gas have generally followed those prices allowed by the FPC in order that they may compete with the bidding of other inter-state gas companies, most notably, Northern Natural Gas Company, Colorado Interstate Gas Company, and Kansas-Nebraska Gas Company. MDU's new gas price will be \$1.42/MCF with 1¢/quarter increases subsequent to July 27, 1976 and in line with FPC Opinion 770. MPC has recently purchased gas from a producer in the Browning area at a price competitive with the Canadian border price.

The table outlining the price of Canadian gas in the first part of this letter is self-explanatory in establishing the most recent trend. Included with this letter are various correspondence sent and received by this Commission which deal with the Canadian border price. You will note that the Canadians would prefer to price their gas in order to meet the cheapest competitive fuel alternative in a given market area, but our State Department

prefers one average border price.

Had the Canadian view point been sustained, Montana may well have seen a stabilization of natural gas prices. The State Department's reply to Representative Melcher contains two inaccuracies of note to Montanans. First, the import quantity authorized to MPC is for 34.2 BCF rather than the 43 BCF stated in the table attached to their reply. Second, the State Department calculates its net savings to U. S. customers on an MCF basis when in fact the border price is based on million BTUs of energy. There is doubt a country sophisticated enough to properly apply basic economics to a given situation would be then dumb enough to get short changed by \$38 million; the reverse may be true.

Electrical rates have not been raised to MPC and MDU customers since 1972. At present both have cases pending before the Commission and it would be inappropriate at this time to speculate what increases may be granted in either of these cases.

Hopefully you will find this letter helpful in answering some of the questions you had in your correspondence.

Sincerely,

MONTANA PUBLIC SERVICE COMMISSION



William J. Opitz, Administrator
Utility Division

td

Enclosures

FEDERAL POWER COMMISSION
WASHINGTON D.C. 20426

IN REPLY REFER TO

Docket No. RP76-113
Great Lakes Transmission Company, et al.

SEC



June 28, 1976

THE THE PARTY ADDRESSED

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JUL 6 1976

MONT. P.S. COMMISSION

Gentlemen:

Your attention is invited to the above-designated proceeding, which is now pending before this Commission and which is more fully described in the enclosure.

We will be glad to receive any comments or suggestions you may desire to submit in connection with this matter.

Notice of this proceeding has also been sent to the governor of your state.

Very truly yours,

Kenneth F. Plumb
Secretary

Enclosure

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F	J
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J	

UNITED STATES OF AMERICA
FEDERAL POWER COMMISSION



Before Commissioners: Richard L. Dunham, Chairman;
Don S. Smith, and John H. Holloman III.

Great Lakes Gas Transmission Company)
Inter-City Minnesota Pipeline Ltd.)
Michigan Wisconsin Pipe Line Company)
Midwestern Gas Transmission Company)
Northwest Pipeline Corporation) Docket No. RP76-113
Pacific Gas Transmission Company)
The Montana Power Company)
St. Lawrence Gas Company, Inc.)
Vermont Gas Systems, Inc.)

RECEIVED

JUL 6 1976

ORDER REQUIRING INFORMATION ON
IMPACT OF PROPOSED PRICE INCREASES
AND SUPPLY AVAILABILITY FOR NATURAL
GAS IMPORTED FROM CANADA

(Issued June 28, 1976)

The Canadian Government has announced an increase in the price of all natural gas exported to the United States. A copy of the statement describing these changes is attached as Appendix A. In view of this development, the Commission believes it necessary to require all gas companies importing natural gas from Canada to file, concurrently with their formal rate filings, data relative to the impact of the proposed price increase. The information submitted should conform to that as requested and more fully described below.

Under the Canadian Government's decision, the current price of \$1.60 per Mcf will be increased to \$1.80 per Mcf effective September 10, 1976, with a further increase to \$1.94 per Mcf effective January 1, 1977. The annual impact upon U. S. consumers of the price increase from \$1.60 to \$1.94 is approximately \$322 million.

The following table shows the estimated annual delivery volumes, existing prices, and final Government prices at various export points:

DC-23

TABLE 1

Export License Holder	Estimated Volume (Bcf)	Border Prices (\$ per Mcf)		
		Effective 11-1-75	Government Effective 9-10-76	Ordered Effective 1-1-77
Alberta & Southern	380.0	\$1.60	\$1.80	\$1.94
Canadian- Montana	43.0	1.60	1.80	1.94
Inter-City Gas	0.4	1.60	1.80	1.94
	6.7	1.30	1.80	1.94
Niagara Gas	5.5	1.60	1.80	1.94
Trans Canada	239.6	1.60	1.80	1.94
	3.9	1.60	1.80	1.94
Westcoast	47.0	1.60	1.80	1.94
	<u>215.5</u>	<u>1.60</u>	<u>1.80</u>	<u>1.94</u>
Total (Bcf)	<u>941.6</u>			
Weighted Average		<u>\$1.60</u>	<u>\$1.80</u>	<u>\$1.94</u>

Table II taken from the NEB report and attached hereto as Appendix B shows the Summary of Estimated Border Values of Canadian Natural Gas by export license number and delivery point, and shows the general physical market area of Canadian imports to the U. S.

The announcement (Appendix A) states that except for certain exports from British Columbia, where operational difficulties have affected production, prospects appear good that exports to the U. S. can be maintained at licensed levels for the coming heating season.

The impact of increasing natural gas prices by \$322,000,000 annually upon United States consumers dependent on imports from Canada is of utmost concern to the Federal Power Commission. The impact upon U. S. consumers dependant upon gas imports from Canada will be significant. The increase to \$1.80 will occur on September 10, 1976, at the onset of the winter, and the increase to \$1.94 will occur on January 1, 1977, in the peak of the winter, when temperature-sensitive residential and commercial consumption is at a maximum and bills for natural gas are at their highest. Industrial consumers can also be expected to pay significantly more for natural gas service.

The Commission therefore finds that the public interest requires an assessment of the impact upon the various classes of ultimate consumers affected by such proposed price increases. The inquiry should focus on expected deliveries from Canadian import sources for the period ending March 31, 1978, and a general assessment of the impact thereof.

The Commission therefore orders a fact-finding inquiry to determine (1) the impact of the Canadian Government's action upon natural gas prices of importing United States pipeline companies, and (2) the impact upon various classes of ultimate consumers affected by such imports. The prices of alternate fuels in the markets served with such imports should also be provided. Additionally, the inquiry will focus on expected deliveries from Canadian exporters ending March 31, 1978, and a general assessment of the impact thereof. Respondent pipelines which receive Canadian imports at the border should secure, and provide for the record, information relating to the existing prices paid by Canadian distributors at locations nearest the export delivery point. 1/

1/ This inquiry relates to the difference between prices to Canadian distributors and U. S. importing pipelines, for comparable natural gas service, in the vicinity of the international border.

Other issues which will be explored include (1) whether the Commission, under Section 3 of the Natural Gas Act, should modify existing import permits regarding delivery volumes and/or prices to mitigate unacceptable economic impacts should such be found.

The information requested above should be supplied by respondent importing pipelines by July 9, 1976. Thus receipt of these data should generally coincide with formal rate filings made by such pipelines which must be filed with this Commission in early July, 1976. ^{2/} These filings are necessary to permit pass-through of cost of purchase gas increases ordered by the Canadian Government on September 10, 1976, and January 1, 1977.

Procedures governing Commission treatment of such rate filing will be the subject of further Commission orders when such filings are received.

The Commission finds:

It is necessary and proper to institute a formal report to the Commission pursuant to Sections 3, 10, 14 and 16 of the Natural Gas Act and the Commission's Regulations thereunder, into the matters set forth above.

The Commission orders:

(A) Pursuant to its authority under Sections 3, 10, 14 and 16 of the Natural Gas Act, and Executive Orders Nos. 10485 and 8202, the Commission orders that a report be filed with the Commission concerning the impact of proposed price increases for natural gas imported from Canada upon United States consumers.

(B) All above named respondents to this proceeding are hereby ordered to file a report with the Commission by July 9, 1976, which shows the anticipated price increases on natural gas supplies imported from Canada. Each respondent shall submit data showing the effect on its existing rates of the proposed price increases for the 12 months ending December 31, 1977, and the annual dollar increase to be passed on to each of its customers, including direct and resale. Respondents involved primarily in distribution activities shall indicate the unit and annual dollar impact upon various classes of customers rather than for each customer.

^{2/} On June 17, 1976, Pacific Gas Transmission Company filed a notice of rate change to reflect increases in the price of Canadian gas in Docket No. RP76-110.

Respondents involved primarily in transportation activities shall make a general assessment of the economic impact of the proposed price increases upon direct sales customers and upon various classes of ultimate consumers served by major distribution customers of such respondents. All respondents shall submit information relating to monthly availability of natural gas supplies from Canada under existing licenses for each month up through March, 1978. If available, respondents shall also submit information relating to current or proposed natural gas prices of Canadian distributors located nearest to United States import delivery points.

By the Commission.

(S E A L)

Kenneth F. Plumb,
Secretary

STATEMENT OF THE HONOURABLE ALASTAIR GILLESPIE
MINISTER OF ENERGY, MINES AND RESOURCES ON
EXPORT GAS PRICING, JUNE 10, 1976

The Minister of Energy, Mines and Resources today issued the following statement on pricing of natural gas exported to the United States.

The Government has decided that the international border price of Canadian natural gas exports should be increased in two stages to \$1.94 per thousand cubic feet.

This decision has been taken in light of recommendations by the National Energy Board and following discussions with producer provinces and with the United States Government.

The Federal Government is committed to increasing natural gas prices in domestic and export markets in order to achieve full value for this commodity. In this connection, on May 18, 1976 I announced increases in the city-gate price of natural gas for Canadian consumption east of Alberta which will amount to about 21.2 percent by January 1, 1977.

The Government has increased the price of export gas in stages from November 1, 1974 to the present level of \$1.60 per thousand cubic feet which became effective on November 1, 1975. These increases were part of the process of moving export prices towards a fair market value, but the \$1.60 price still did not reflect the full value of this fuel.

In April of this year, the Government received the National Energy Board's third Report in the matter of pricing of natural gas being exported under existing licences. The Board recommended prices for different licences varying from \$1.60 to \$2.10 per thousand cubic feet. These price recommendations were based on export values derived from available competitive energy alternatives in market areas concerned, which extend from California to Vermont. This price differentiation, which is in conformity with the concept of pricing according to their value in each market area, was anticipated in my predecessors announcement of the last previous export price increases. While the Board did not find it possible to wholly rely on any measurement of commodity value, the export prices recommended in the Board's report were, in its judgment, close to current commodity values in various market areas. The Government carefully reviewed the Board's recommendations and accepted the values proposed for each licence, with the exception of those relating to exports by Alberta and Southern Gas Company of gas for sale in northern California.

In this instance, the Government felt that the increase to \$2.10 at this time would be too sharp and that a border price of \$2.00 per thousand cubic feet would be more appropriate. The average border value of all gas being exported would, on the basis of the Board's recommendation, become \$1.98. However, after adjusting for the change in price of Alberta and Southern's exports, the average would become \$1.94 per thousand cubic feet which represents an increase of 21.25 percent over the current border price.

As I indicated in the House of Commons on May 18, advance consultations have been held with the United States. This is normal in cases where important energy decisions are being taken by one country which affect the other. In these discussions, the United States Government expressed a strong preference for a single average border price, rather than a set of prices reflecting the varying competitive conditions in the different market areas served. Such averaging would result in the impact of increases being more severe in markets where the value of competing fuels is lower than average or which are farther from the border. The Government has considered the United States Government representations and decided, at this time, to convert separate prices to an average border price in conformity with the United States Government's wishes. However, it remains the Canadian Government's policy to ensure as far as possible that our export gas is priced in relation to alternative available energy sources in the markets concerned. The Government has further decided that the export price increase should again take place in two stages, as is the case for the recently announced price increases to Canadian consumers. Such an approach of course eases the transition to higher price levels.

The price of natural gas exported under all existing licences will therefore become \$1.80 per thousand cubic feet effective September 10, 1976. This three month lead time was recommended by the National Energy Board and will permit normal regulatory processes to occur in the United States. Effective January 1, 1977 the border price for all licences will rise to \$1.94 per thousand cubic feet. This decision excludes minor quantities of peaking service gas which will continue to be priced on the current peaking service basis.

In the National Energy Board's view, the \$1.94 price fully reflects a minimum current replacement value of our export gas in relation to international oil. This price should yield additional revenues of about \$320 million in a full year. All of the increase in the price of Alberta gas, which comprises the bulk of our exports, will in the first instance flow back to the producers, thereby further stimulating development of new supplies. The Government anticipates that the Government of British Columbia will wish to ensure that a similar stimulus is given to gas development in that province.

Partly as a result of the Government's gas pricing policy, there has during the past year or so been a striking increase in Canadian gas exploration and development activity and some improvement in immediate gas deliverability. With the exception of certain exports from British Columbia, where operational difficulties have for some years affected production from some fields, there has been no cut back in export volumes and prospects appear good that exports other than from British Columbia can be maintained at licensed levels for the coming heating season.

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TABLE II
Summary of Estimated Border Values of Canadian Natural Gas
 (\$/Mcf)

Licence Holder	Licence Number	Border Point	Market Area	Estimated Commodity Value, January, 1976					Substitution (e) Value	1976 Recommended Price
				Present Border Price	World (a) Price	World (b) Crude Price #1	World (c) Crude Price #2	Parity (d) C.P.A.		
ALS	3,16,24,35	Kingsgate	N. California	1.60	2.03	2.19	2.13	2.90	1.89	2.10
Can-Mont	5,17,25,36	Aden Carway	Montana	1.60	1.43	1.65	1.65	2.60	1.79	1.80
I.C.G.	28	Sprague	N. Minn.	1.60	1.93	2.20	2.04	2.44	1.99	1.80
	29	Ft. Frances	N. Minn.	1.30	1.06	1.07	1.07	2.44	1.99	1.60
Niagara	6	Cornwall	N. New York	1.60	1.89	2.19	2.00	3.15	2.28	1.80
TCPL	1,18,38	Emerson	Midwest	1.60	1.61	2.09	1.81	2.77*	1.99	2.00
	20	Emerson	Midwest	1.60	1.69	2.15	1.91	3.05	1.99	2.00
	37	Emerson	Midwest	1.60	1.60	1.90	1.77	2.61*	1.99	2.00
	39	Emerson	Midwest	1.60	1.92	2.34	2.25	2.41*	1.99	2.00
TCPL Emerson Average				1.60	1.62	2.04	1.82	2.75	1.99	2.00
	19	Phillipsburg	Vermont	1.60	1.48	1.74	1.56	2.58	2.28	1.80
Westcoast	4	Kingsgate	Pacific N.W.	1.60	1.86	1.97	1.83	1.72	1.89	2.00
	41	Huntingdon	Pacific N.W.	1.60	1.35	1.89	1.42	1.76*	1.89	1.80
		Weighted Average		1.60	1.72	2.04	1.84	2.53*	1.92	1.93

(a) Commodity value using actual market prices prevailing in January 1976 as submitted by licensees.

(b) Commodity value using actual market prices prevailing in January 1976 as submitted by licensees except for petroleum products. Petroleum product prices used are the prevailing world oil prices adjusted for representative refinery and distribution margins.

(c) Same as (b), except that the actual market #6 fuel oil prices have been substituted where #6 oil is designated as the alternative fuel.

(d) Calculated similarly for (a), but adjusted for differences in capital investment and operating costs associated with using gas.

(e) The estimated value of natural gas exported now which could otherwise serve domestic markets supplied by imported oil, adjusted for transmission costs.

* These are average prices derived by applying N.E.M. regional weights to C.P.A. individual state border values.

July 21, 1976

The Honorable Lee Metcalf
1121 Dirksen Senate Office Building
Washington, D.C. 20510

Dear Lee:

The Minister of Energy, Mines and Resources announced on June 10, 1976 that the Canadian Government had decided the international border price of Canadian natural gas exports would be increased in two stages to \$1.94 per thousand cubic feet or one MCF. The first increase is from \$1.60 to \$1.80 per thousand cubic feet effective September 10, 1976; the latter increase will take effect January 1, 1977.

The National Energy Board's third Report in the matter of pricing of natural gas recommended varying border prices based on export values derived from available competitive energy alternatives in market areas concerned. In the case of Montana, the price would have been \$1.80 per thousand cubic feet because the alternative energy forms are hydro power, coal produced thermal electricity and coal.

However, the United States Government expressed a strong preference for a single average border price, rather than a set of prices reflecting the varying competitive conditions in the different market areas served. No rationale for the United States' position was stated.

The position of the United States Government will have both short and long term impact on the price paid for natural gas by Montana consumers. The immediate effect will be to increase the cost of purchased gas to the Montana Power Company's customers by \$3,875,000 per year based on a projected purchase volume of 27,671,723 MCF for 1976.

Additionally, because royalty charges are tied to the border price, the royalty gas will be somewhat higher also, perhaps by as much as \$300,000 per year. These figures may vary if Montana Power

The Honorable Lee Metcalf
Page Two
July 20, 1976

successfully shifts its gas supply from Carway to Aden, thereby increasing its take on royalty gas and decreasing its purchased gas. Obviously too, the premium dollars paid to Canada are lost to the economy of this state.

The long term effect of the United States' "policy" would be to tie Montana's price to the weighted average price of the alternatives in the marketing areas for Canadian natural gas. Because of the volumes involved, the alternative with the greatest weight is OPEC oil. Therefore, improper and false economic signals will be sent to industrial and other customers of the Montana Power Company, forcing an early and premature departure from their natural gas system.

We mention industrial customers because they are the ones who can more readily convert to an alternative energy source, and by such conversions leave behind the remaining small customers to pay the fixed costs of a system operating at or near 50 percent capacity. Further price increases to residential and small commercial customers will be the end result.

Further, using the United States' approach to pricing, a lack of ever seeing a "stable" price for natural gas in Montana will be based on the monopolistic actions of the OPEC nations.

In recognition of the detrimental effects which could follow from implementation of the United States' "policy", we as a Commission favor the Canadian proposition of pricing in consideration of the competitive fuel situation.

We appreciate your review of this matter and any action which you regard as appropriate.

Sincerely,

Gordon E. Bollinger
Chairman

GEB:geb

Congress of the United States
House of Representatives

JOHN MELCHER

MONTANA—EASTERN DISTRICT

CHAIRMAN—SUBCOMMITTEE ON PUBLIC LANDS

COMMITTEES:

INTERIOR

ENVIRONMENT AND ENERGY
MINES AND MINING
INDIAN AFFAIRS

AGRICULTURE

LIVESTOCK AND GRAINS
FAMILY FARMS AND
RURAL DEVELOPMENT
FORESTS

September 21, 1976

Gordon E. Bollinger
Chairman
Montana Public Service Commission
1227 11th Avenue
Helena, Montana 59601

Dear Gordon:

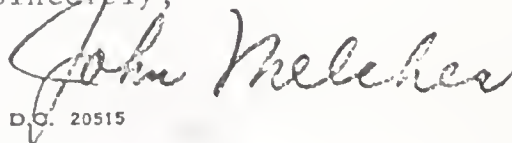
Enclosed is the response I received as a result of my most recent letter to Secretary of State Kissinger about the State Department role in persuading Canada to adopt a single average border price increase for Canadian natural gas imported into the United States. As you know, I forwarded a copy of your letter to the Secretary so that your specific concerns could be addressed.

The Department has flatly rejected the idea of reopening the gas price issue because "...the overall impact of our position has been helpful to a majority of U. S. consumers of Canadian gas...". The summary attached to the response points out that Montana consumers do indeed stand to pay at least \$6 million more annually for natural gas (beginning next year) than would have been the case under the Canadian National Energy Board proposal. Neither the summary nor the Department letter address your point about the long term distortion of Montana's natural gas markets.

It is clear that, along with graciously taking credit in behalf of the Ford Administration for solving some of Montana Power Company's gas supply problems, we have been sacrificed for the benefit of gas consumers in California, the Pacific Northwest and the midwestern United States.

Best regards.

Sincerely,



September 7, 1976

Dear Mr. Melcher:

Secretary Kissinger has asked me to reply to your letter of August 2, concerning the increase in the price of Canadian natural gas. This letter will supplement the information I sent to you on August 4.

As I explained in my earlier letter, two-thirds of U.S. consumers of Canadian gas will pay less for gas at the uniform price of \$1.94 per thousand cubic feet (mcf) than they would have if a schedule of variable prices had been established by the Canadians. As a result, 38 million dollars per year will be saved by US consumers of Canadian gas. I have enclosed a copy of the calculations made to determine the amount of savings.

Before urging the Canadians to set a single export price, the Administration considered what impact that position would have on different regions of the US. We recognized that some consumers, including those in Montana, would have to pay more than they would have under a variable price schedule. However, it is the responsibility of the Administration to pursue the greatest good for the greatest number, even though the effects in certain regions are undesirable.

The impact in Montana is clearly undesirable, as Mr. Bollinger explains, I wish to point out, however, that the Administration has actively supported the Montana Power Company in its effort to modify Canadian natural gas export licenses. The success of these efforts has permitted the company to maintain the volume of gas it receives from Canada, and therefore to continue to meet the needs of consumers in Montana. Without the Administration's involvement, gas consumers in your state could have faced serious supply curtailments.

The Honorable
John Melcher,
House of Representatives.

I have enclosed a complete, detailed description of the Department of State's discussions with the Government of Canada about gas export prices. This is the document mentioned by Mr. Katz to members of your staff. The narrative covers the period beginning with regulation by the Canadian Federal Government of gas export prices as a matter of national policy, and describes developments up to the present. I hope this information will help you understand the strenuous efforts made by the Administration on behalf of all U.S. consumers of Canadian gas.

As the Secretary indicated last month in Seattle, the Department has reviewed its position on Canadian gas export prices. Since the overall impact of our position has been helpful to a majority of U.S. consumers of Canadian gas, it has been decided that the issue should not be re-opened.

Sincerely,

Robert J. McCloskey
Assistant Secretary for
Congressional Relations

Enclosure:
As stated.

OFFICIAL U.S. ACTIONS TO INFLUENCE CANADIAN NATURAL GAS PRICE DECISIONS

The United States has been a major market for Canadian gas for over twenty years. Deliveries started on an emergency basis during the Korean War and were continued on a regular and greatly expanded basis in the post-war era. The Canadian National Energy Board Act of 1959 established the NEB and give it a mandate to certify that existing and future gas exports are: 1) surplus to Canadian needs; and 2) sold at "just and reasonable" prices.

In the period following the creation of the NEB, Canadian gas sales to the U.S. were further expanded, and many Northern Tier states plus Northern California came to rely in varying degrees on Canadian gas. Currently, the U.S. imports almost 1 trillion cubic feet of gas per year from Canada, 4.5% of U.S. consumption and nearly 45% of Canadian production.

Until very recently Canada has been a net petroleum exporter, exporting significant quantities of oil produced in its western provinces to the U.S. while importing smaller amounts of relatively less expensive oil for its energy deficient eastern provinces. Over the last three years, as Canada reduced its oil exports to the U.S., the favorable trade balance for Canada implicit in this arrangement changed dramatically. During this same period, Canada has reassessed its potential energy resources which led to a sharp downward revision in Canadian oil and gas reserve estimates. Despite the reduction in the level of oil exports to the U.S., the absence of a transportation system to move oil from producing to consuming areas made Canada a net oil importer in 1975.

The Canadian Government has followed a policy of gradually raising domestic prices for oil and natural gas. The populous eastern provinces of Canada are interested in keeping prices as low as possible for as long as possible. In contrast, the western provinces, in which the bulk of gas and oil resources are located, are interested in maximizing current revenue from this production. By keeping export prices higher than domestic prices, the Canadian Government is able to partially satisfy both regions.

The events which culminated in the most recently announced gas price increases began with the issuance of an NEB report in 1974 on future gas supply and demand and on prices. This report recommended to the government an immediate increase in the export price for natural gas from \$.43 to \$1.00 per thousand cubic feet (mcf), with additional annual increases of \$0.20 per mcf over the following three years. The NEB contended that these price increases were required to bring the price of Canadian export gas up to its "commodity value", i.e. to a price roughly equal on a BTU basis with competing fuels in US markets served by Canadian gas exports. The Government of Canada implemented the recommended \$1.00 price for British Columbia's natural gas exports on November 1, 1974 and for the other provinces on January 1, 1975; it rejected the \$0.20 increments. However, the Canadian Government supported the NEB view that natural gas export prices should be compatible with the price of alternative energy sources and indicated that prices would be progressively increased to commodity value levels.

The U.S. Government protested strongly against the price increases in December 1974. While the proposed increase was not modified, we obtained a commitment from Canadian authorities to consult with us in advance of any future price decision.

In March, 1975, the NEB issued a second report recommending that natural gas export prices be raised to \$1.60/mcf. U.S. officials were given the opportunity for consultations with the Government of Canada in April prior to its decision on the recommendation in the NEB's report.

At this meeting, a U.S. delegation led by the Department of State and including representatives of the Federal Power Commission and the FEA sought:

- to delay the effective date of any new price increase;
- to assure parity between Canadian domestic gas prices and export prices; and
- because supply curtailments were an immediate threat, to relate production shortfalls and price.

The US team argued that further increases in natural gas prices would discriminate against U.S. consumers and impact adversely on certain highly dependent regions in the U.S. The US officials stressed the need to delay a new price decision in order to have an opportunity for full bilateral consultations on natural gas export as had been agreed by the two governments in December of 1974.

In the course of the ensuing discussion Canadian officials maintained that the NEB's recommended price of \$1.60/mcf was "just and reasonable" in view of the cost of alternative fuels in the U.S., the cost to Canada of replacement fuels and, Canada's commitment to raise domestic gas prices over time. These officials argued that it was politically indefensible in Canada that the then current city-gate price in Buffalo, New York was \$.65 per mcf (due to Canadian gas being rolled in with less expensive regulated U.S. gas) while the city-gate price in Toronto was \$1.03 per mcf.

In its final decision on export prices for natural gas, the Canadian Government decided to postpone the implementation date in order to give the Federal Power Commission time to make the necessary regulatory changes. Also, the increase was phased-in rather than imposed in full at one time. The export price of Canadian gas was raised to \$1.40 per mcf on August 1, 1975 and to \$1.60 on November 1, 1975.

In late February, 1976, in anticipation of the NEB's annual gas review, the British Columbia Energy Commission (BCEC) submitted to the Board a new study on gas production and prices and sought an immediate increase in the border price of gas exports to \$2.00. In May the NEB submitted a report to the Canadian Government recommending an average price of \$1.98.

This average price of \$1.98 resulted from an NEB recommendation that a range of border prices, from \$1.60 to \$2.10 per mcf, be introduced. The varying prices recommended were based on "export-values" derived from the cost of competing alternative fuels in the U.S. regional markets in which Canadian gas is sold, and not on the earlier concept of "commodity-values". The NEB report pointed out, however, that the export values approximate the "commodity values" in the relevant markets.

Before the NEB's recommendations were made, and in anticipation of a possible price increase, the USG had conducted a comprehensive analysis of energy prices in regions served by natural gas imported from Canada. This review was undertaken after the U.S. Embassy reported in March the probability of a Canadian decision to increase domestic oil and gas prices. Embassy officials believed such action on domestic prices would presage a further increase in export gas prices.

During the analysis performed in April 1976, U.S. gas distribution companies in regions dependent upon Canadian gas were consulted and supplied data about the cost of alternative sources of energy in regions they serviced.

The study analyzed the actual fuel costs in the 12 affected states in terms of the NEB's definition of "commodity price". The preliminary conclusion was that no new price increase beyond the current level of \$1.60 per mcf was justified. Moreover, it was determined that the BCEC's recommendation to the NEB of a \$2.00 per mcf border price was based not on "commodity value" but on a combination of: the expected rise in U.S. fuel prices (as the economy turned up); fuel replacement costs for Canada (portending new price increases in the future if OPEC prices rose or if Canada determined that liquefied natural gas, synthetic natural gas or Mackenzie Delta gas was the relevant "replacement" fuel); and the price level needed to discourage U.S. industry, including electric utilities, from using gas.

Upon completion of this analysis in early May, the U.S. Embassy in Ottawa was instructed to make representations to the Government of Canada based on the report's findings. Embassy officials discussed with Canadian officials the points made in the U.S. report and stressed our strong concern over continued price discrimination against U.S. consumers of Canadian gas.

At the time of this demarche, Canadian officials provided U.S. officials with a copy of the NEB report. In view of the findings in the report it was decided that U.S. and Canadian technical-level officials should discuss the methodology used by the NEB in arriving at the recommended price increase and the reasons for the discrepancies between the Canadian report and the U.S. Government analysis. In mid-May, the U.S.

sent a delegation of staff level officials from the Department of State, Federal Energy Agency, Federal Power Commission and the Department of Commerce to Ottawa. The delegation concluded that, while the Canadian data was essentially correct it was being used by the NEB in a highly subjective manner in order to support the recommended price increases. The US team recommended an early policy-level meeting with Canada.

U.S. officials decided that further consultations should be arranged between the two governments provided the GOC was prepared to take US views into account in reaching a decision and Canadian officials agreed to delay release of the NEB's report on export gas prices until after these consultations took place. Although the Canadian Government announced domestic price hikes for gas and oil (which had been pending since March) and stated that export prices would also be increased soon the amount of the latter increase was not specified. After approaches to the Canadian Government at several levels during May, a bilateral meeting of policy-level officials was set for May 26.

Representatives from the Department of State and FEA, with staff support from the FPC, made up the U.S. delegation which attended the May 26 meeting in Ottawa. Again, the U.S. delegation emphasized our serious concern over the growing price discrimination between U.S. and Canadian customers, and protested the magnitude and rapidity of the price increases which had been imposed since 1973.

The U.S. delegation protested the NEB's recommendation for price discrimination among U.S. markets. They stressed the US view that differential pricing would pose extreme difficulties for U.S. regulatory agencies. In addition, the US team concluded the US could not acquiesce in a process by which a foreign government would establish discriminatory prices among U.S. customers based on external criteria -- thus in effect requiring that consumers in areas which would pay higher prices for natural gas imported from Canada subsidize consumers in regions where lower prices would be imposed. The U.S. team said that the U.S. recognized the desirability of increasing the price of natural gas to world market price levels, and accepted that objective as sound energy policy. How-

ever, the team stated that the USG did not believe it was sound energy policy to discriminate between prices in Canada and in the U.S., nor to raise prices more than once per year as has been the case since 1974. We said that it appeared that the Canadians had changed the method by which export prices were set, and that the method seemed likely to change again. The NEB had apparently chosen subjectively to find a criterion which would assure that the maximum price is obtained in each region served by Canadian gas exports. The U.S. side said it could not understand why U.S. consumers should have to be the medium for subsidizing domestic energy use in Canada.

Canadian officials responded that domestic Canadian prices had risen as rapidly as export prices. In fact, the Canadian Government was being criticized for not cutting off natural gas and oil exports entirely. While the Canadian Government intended to ensure that existing contracts for natural gas exports are fulfilled, it cannot export gas at less than replacement value.

The US side asked the Canadians to explain the rationale for "replacement value" and observed that the basis for calculation had changed since 1975. While the US understood the difficulty with setting objective standards of value, the US side could not understand why the Canadians were proposing to increase the existing level of discrimination between U.S. and Canadian consumers and proposing different price levels for various regions in the U.S.

The Canadian officials argued that their producers had a right to the benefits from the sale of their gas, and pointed out exploratory activity had increased as a result of earlier price increases with a consequent expansion of gas supply. They further supported the price increases by arguing that: 1) since the recent domestic price increase in Canada amounted to a 25% rise while export prices would only go up 23.5%, discrimination against export customers would be reduced; 2) Canadian domestic energy prices were generally higher than U.S. prices; and 3) Canada needed higher prices to pay for replacement fuels. The Canadian officials indicated that the NEB report would be sent to the Cabinet by June 3, put on the agenda for consideration by the Cabinet for final decision on June 10. Canadian officials assured US representatives that U.S. concerns would be taken into consideration by the Cabinet.

The US delegation indicated that another increase in natural gas export prices would create strong political reactions in the U.S., and might result in a reexamination of other aspects of US/Canadian bilateral trade. US officials noted that it appeared that the range of prices proposed were intended to produce sufficient revenues to meet Provincial and Federal revenue targets, and since the NEB could not agree on a fair test of "commodity value", U.S. customers would be charged all the traffic would bear.

The American side also questioned what basis might be used for "commodity value" in the future. The NEB had earlier indicated that a "premium value" may be changed for natural gas because of its desirable characteristics. The Canadian side said that the concept of a premium value was being considered, as were other pricing methods such as the costs of LNG and SNG.

In the last few days of May and the first week of June, U.S. officials in Washington and Ottawa maintained contact with Canadian officials and reiterated the U.S. position on prices which had been stated during the May 26 meeting. On June 10 Canadian Government officials announced an increase in export gas prices to \$1.94, on January 1, 1977, with an interim step to \$1.80 on September 10, 1976. Primarily because of USG efforts, the price is less than the price level recommended by the NEB, thus representing an annual saving of some \$40 million for U.S. consumers. It also does not discriminate among them. In fact, under this uniform export price decision, some 66 percent of US imports of Canadian natural gas will be priced at a lower level than would have been the case had the differential pricing recommendations been carried out. Canadian gas prices domestically remain lower than those charged for exports, although the Canadian Government has stated its intention to gradually reduce this disparity. However, in view of the NEB report's discussion of replacement fuel cost, additional price increases for natural gas imports from Canada are possible.

CALCULATIONS OF SAVINGS TO U.S.
CONSUMERS OF CANADIAN NATURAL GAS

(1) <u>Market Area</u>	(2) <u>Volume (MCF/Year)</u>	(3) <u>NEB Recommended Price</u>	(4) <u>Cost/Year at NEB Prices (2)X(3)</u>	(5) <u>Cost/Year at \$1.94 per MCF (2)X \$1.94</u>
N. California	380,000,000	\$2.10	789,000,000	737,200,000
Midwest	239,600,000	2.00	479,200,000	464,324,000
Pacific N.W.	47,000,000	2.00	94,000,000	91,180,000
Pacific N.W.	215,500,000	1.80	387,900,000	418,070,000
Montana	43,000,000	1.80	77,400,000	83,420,000
Niagara, N.Y.	5,500,000	1.80	9,900,000	10,670,000
Vermont	3,900,000	1.80	7,020,000	7,566,000
Minnesota	400,000	1.80	720,000	776,000
Minnesota	6,700,000	1.60	10,720,000	12,998,000
Total	941,600,000	--	1,864,860,000	1,826,704,000

Savings to U.S. consumers = Total Cost/Year at NEB recommended prices minus total cost/year at \$1.94/mcf

=	\$1,864,860,000
-	1,826,704,000
	<u>38,156,000</u>



CANADA

NATIONAL ENERGY BOARD
OFFICE NATIONAL DE L'ENERGIE

BUREAU DU PRESIDENT

File: D440-2-6

September 24, 1976

Mr. S.L. Groff,
Director and State Geologist,
Montana Bureau of Mines and Geology,
Montana College of Mineral Science and Technology,
Butte, Montana,
U.S.A.
59701.

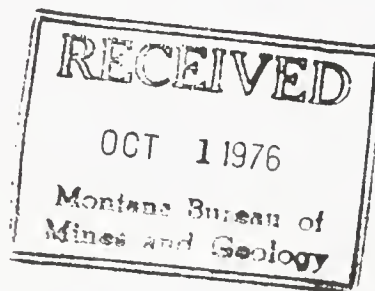
Dear Mr. Groff:

In response to your letter dated July 26, 1976 concerning your report on energy cost trends, please find attached two summaries, entitled respectively "Oil Pricing Policy" and "Gas Pricing Policy".

I hope these summaries will be of assistance to you in the preparation of your report.

Yours sincerely,

A handwritten signature in cursive script, appearing to read "P. H. Crowe".
Marshall A. Crowe



Oil Pricing Policy

Until the mid-1970's, the Government of Canada did not intervene actively in the area of petroleum prices in domestic or export markets except insofar as ensuring observance of the fundamental principle that sales abroad of resources, including energy, should be at adequate, realistic and internationally recognized prices.

World events in the fall of 1973, flowing from the renewed outbreak of Arab-Israeli hostilities, served to intensify and dramatize processes which had been going on for several years in the world oil industry, among which was a rapid escalation of crude oil prices in the OPEC group of producing countries. Canada, in common with other industrialized countries, was faced with an "oil crisis" and the Federal Government took the requisite steps to protect the Canadian consumer from the immediate effects. Being, nominally at least, self-sufficient in oil, Canada was in a position to avoid the worst effects of rapid oil price increases; on the other hand, since a very large part of requirements into Eastern Canada were imported, counterbalanced by exports of more or less the same proportions from the West, there was the problem of potentially widely different prices on both sides of Canada and in the export market as well. An export charge on petroleum and a compensation scheme for companies importing offshore oil, the first instituted in October 1973 and the second at the beginning of 1974, were designed to ensure uniform costs of crude oil for all Canadian refiners while at the same time satisfying the obligation to see that Canadian resources are exported at world prices.

It is recognized that the price of oil to Canadians cannot remain indefinitely below the international price. The aim is to have a gradual movement to equilibrium; as a result of meetings of federal and provincial authorities there have already been three increases in the Canadian wellhead price (of \$2.70 per barrel in April 1974, others of \$1.50 in July 1975 and \$1.05 in July 1976) and there will probably be further ones in the future. Naturally, such wellhead increases do not affect the price to the export customer.

For illustrative purposes, a table attached shows the course over the past three years of the components of the delivered price of a light, low-sulphur Canadian crude oil at Chicago. The figures would, of course, vary for other grades and other destinations.

In May 1974 it was found necessary, in order to maintain the principle of adequate export prices, to place a charge on exports of refined oil products such as motor gasoline, middle distillates and heavy fuel oil. These refined product export charges have tended to fluctuate rather more widely than the charges on crude oil exports as a consequence of the greater volatility of the markets involved. At present (August 1976) they stand at \$4.50/bbl on motor gasoline, \$3.75/bbl on middle distillates, \$3.25/bbl on heavy fuel oil and \$3.65/bbl on partially processed oils.

Oil Export Policy

In effect Canadian petroleum exports were under volumetric restriction throughout the 1960's when they were the subject of regular consultation between United States and Canadian officials although nominally exempted from the United States Mandatory Oil Import Program. This situation changed radically by the end of 1972, when Canada was producing at capacity and exporting to the United States at a rate which threatened supplies for her own refiners. Accordingly, it was decided by the Canadian Government to place crude oil exports under licence as from March 1973 and monthly licences have been issued ever since. Permissible volumes, i.e., all producible oil in excess of the requirements of Canadian refiners for domestic oil have been distributed among exporters in accordance with allocation plans developed in consultation with industry and United States Government officials. Since the early part of 1976, the allocations have conformed with a priority system developed for refiners in particular circumstances and different geographical areas by the United States Federal Energy Administration, the actual distribution in the United States of total permissible Canadian crude oil exports thus being in effect determined by that Agency.

At the time the Government announced export controls on crude oil, it stated that a public hearing would be held on Canadian oil supply and demand in the context of future oil exports. As a result of the first hearing, held by the National Energy Board in the spring of 1974, it was decided that exports should be reduced according to a stepwise formula related to the surplus of Canadian oil producibility over Canadian requirements for domestic oil each year and the number of years remaining until the surplus would disappear. Another hearing was conducted in 1975 to update the 1974 findings and a further one is scheduled for October 1976. Probably annual hearings will continue in order to reassess the prospective surplus.

Under the formula, administered by the National Energy Board, the annual amount of crude oil available for export is fixed in relation to oil producibility, Canadian demand, and a conservation factor estimated for that year. This has the effect of reducing oil exports progressively as the estimated period of self-sufficiency decreases in the area of Canada served by oil of Canadian origin.

The formula resulted in exports being reduced from a 1974 average of 910 M b/d to limitations of 700 M b/d in 1975 and an average of 460 M b/d in 1976. According to the 1975 assessment (to be reviewed in the October hearings), exports would decline to zero by late 1981. It is hoped that significant volumes from northern frontier regions and from the oil sands in Alberta will subsequently substitute for the decline in production from established oilfields.

The criteria for allowing the export of refined petroleum products, which first came under licence in June 1973, are not different from those related to crude oil exports, i.e., exports can only be authorized if the material concerned is surplus to Canadian requirements and will be sold at a price which is adequate and realistic. However, the circumstances under which refined product surpluses arise are different, being related to refinery operations which may be flexible in some degree and to problems of joint products and limitations of storage capacity rather than, as in the case of crude oil, to a given resource base consisting of a more or less homogenous commodity. Therefore product export licencing has so far proceeded on an ad hoc basis with authorizations confined to particular volumes to specific customers and destinations rather than monthly flows based on annual permissible volumes as for crude oil exports.

Nevertheless, circumstances may arise to justify long term licences for refined product exports. The first of the applications for such licences will be the subject of hearings by the National Energy Board in September 1976.

DELIVERED PRICES AT CHICAGO: PER BARREL

(40° API, 0.2% Canadian Crude)

<u>DATE</u>	<u>AT EDMONTON</u>	<u>PIPE- LINE</u>	<u>EXPORT CHARGE</u>	<u>TOTAL CDN \$</u>	<u>US \$1 IN** CDN FUNDS</u>	<u>DELIVERED CHICAGO US \$</u>
Oct. 1973	4.05	0.44	0.40	4.89	1.0009	4.89
Nov.	4.05	0.44	0.40	4.89	0.9988	4.90
Dec.	4.05	0.44	1.90	6.39	0.9914	6.44
Jan. 1974	4.05	0.44	2.20	6.69	0.9991	6.70
Feb.	4.05	0.44	6.40	10.89	0.9767	11.15
Mar.	4.05	0.44	6.40	10.89	0.9720	11.20
Apr.	6.75	0.44	4.00	11.19	0.9672	11.57
May	6.75	0.44	4.00	11.19	0.9621	11.63
June	6.75	0.44	5.20	12.39	0.9664	12.82
July	6.75	0.44	5.20	12.39	0.9761	12.69
Aug.	6.75	0.44	5.20	12.39	0.9798	12.65
Sept.	6.75	0.48	5.20	12.43	0.9863	12.60
Oct.	6.75	0.48	5.20	12.43	0.9834	12.64
Nov.	6.75	0.48	5.20	12.43	0.9872	12.59
Dec.*	6.75	0.48	5.20	12.43	0.9881	12.58
Jan. 1975	6.75	0.48	5.20	12.43	0.9947	12.50
Feb.	6.75	0.48	5.20	12.43	1.0000	12.43
Mar.	6.75	0.48	5.50	12.73	1.0000	12.73
Apr.	6.75	0.52	5.50	12.77	1.0110	12.63
May	6.75	0.52	5.50	12.77	1.0281	12.42
June	6.75	0.52	4.70	11.97	1.0263	11.66
July	8.25	0.52	3.20	11.97	1.0307	11.61

DELIVERED PRICES AT CHICAGO: PER BARREL

(40° API, 0.2%S Canadian Crude)

<u>DATE</u>	<u>AT EDMONTON</u>	<u>PIPE- LINE</u>	<u>EXPORT CHARGE</u>	<u>TOTAL CDN \$</u>	<u>US \$1 IN** CDN FUNDS</u>	<u>DELIVERED CHICAGO US \$</u>
Aug.	8.25	0.52	3.20	11.97	1.0352	11.56
Sept.	8.25	0.52	3.45	12.22	1.0261	11.91
Oct.	8.25	0.52	3.45	12.22	1.0249	11.92
Nov.	8.25	0.52	4.50	13.27	1.0136	13.09
Dec.	8.25	0.52	4.50	13.27	1.0138	13.09
Jan. 1976	8.25	0.52	4.50	13.27	1.0063	13.19
Feb.	8.25	0.52	4.50	13.27	0.9937	13.35
Mar.	8.25	0.52	4.60	13.37	0.9858	13.56
Apr.	8.28	0.52	4.60	13.40	0.9833	13.63
May	8.28	0.52	4.60	13.40	0.9833	13.63
June	8.30	0.52	4.60	13.42	0.9833	13.65
July	9.35	0.52	3.55***	13.42	0.9722	13.79
Aug.	9.35	0.52	3.65	13.52	0.9722	13.89
Sept.	9.35	0.52	3.65	13.52	0.9722	13.91

- * Differential charges for heavy crudes introduced.
- ** Arithmetic monthly average inter-bank mid-market rate of bank transactions closest to noon each business day.
- *** Actual export charge \$4.60 but reduced by \$1.05 on oil entering exporting pipeline systems after July 1.

Gas Pricing Policy

Prior to 1975, the National Energy Board (NEB) did not participate in the establishment of domestic prices for natural gas other than regulating rates, tolls, and tariffs, and as means to that end the rate of return, of interprovincial and international pipelines, and by recommending to the Minister of Energy, Mines and Resources such measures as the NEB considered necessary in the public interest for the development and utilization of energy resources. Within this framework, the NEB commenced a public hearing in the fall of 1974, in order to obtain a clearer insight into the short and long term outlook on the demand for, supply and deliverability of natural gas as well as to evaluate criteria on policy responses which would be appropriate to the current situation in the natural gas industry in Canada. As a result of that hearing, the NEB recommended, for the purpose of conserving a valuable non-renewable resource and inducing exploration for the development of new supplies, that the domestic prices of natural gas be phased into commodity value - using as a major yardstick the Btu equivalent of the price of Canadian crude oil in Toronto - over about a three year period.

With the passage of the Petroleum Administration Act on April 30, 1975, the federal government acquired the authority to prescribe the prices of natural gas and the reference price in TransCanada Pipeline's Eastern zone, which includes Southern Ontario and Montreal, was fixed at \$1.25 per million Btu's for CD 100 service on November 1, 1975. This price represented about 85 per cent of the price of Canadian crude oil in the Toronto market. The Toronto reference natural gas price is converted to the equivalent of "imputed Alberta border price" by deducting the cost of transportation determined by the NEB. The "imputed Alberta border price" plus cost of transportation approved by the NEB then becomes the basis for prescribing the price of all gas moving in interprovincial trade. A new Toronto reference price which will amount to about 14.5 cents increase came into effect on July 1, 1976. A further increase of 10 cents has been announced for January 1, 1977.

The NEB is required to satisfy itself under its Act that for each export licence "the price to be charged by an applicant for gas or power exported by him is just and reasonable in relation to the public interest." In addition, the NEB has been required to maintain since September 1976, a surveillance of the border price for exports under currently existing licences. In Section 11A of the Regulations made pursuant to Part VI of the NEB Act, the export licences shall be subject to review when in the opinion of the NEB, there has been significant increase in prices for competing gas supplies or for alternative energy sources. Upon findings and recommendations by the NEB, the Governor in Council may by Order establish a new price for each export licence below which gas exported may not be sold or delivered after such date as may be specified in the Order.

In the spring of 1974, the NEB commenced a public hearing and as a consequence of that hearing, the NEB recommended that in April 1975, that natural gas export prices be revised towards commodity value for all licences with subsequent reviews. An initial price of \$1.00 per million Btu's was established with effect from January 1, 1975, for most export licences of natural gas, as result of this review. The export prices were increased in all licences except one, to \$1.40 per million Btu's effective August 1, 1975, and again with the exception of one, the export prices under all licences were further increased to \$1.60 per million Btu's on November 1, 1975. On June 10, 1976, the Minister of Energy, Mines and Resources announced that the price of natural gas exported under all existing licences will become \$1.80 per million Btu's effective September 10, 1976 and \$1.94 per million Btu's effective January 1, 1977 respectively.

Above is a brief historical review of domestic and export prices of natural gas.

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

August 11, 1976

Mr. S. L. Groff
Director & State Geologist
Montana Bureau of Mines
& Geology
Montana College of Mineral
Science & Technology
Butte, Montana 59701

Dear Sid:

As per your request, I am sending a copy
of FPC Order No. 770 concerning new gas prices.
I am also enclosing some of the recent FPC
releases that may be useful to your analysis.

I am sorry that I cannot provide you with
any projection of price trends from the
Commission.

Sincerely yours,



Frederick W. Lawrence
Technical Director
National Gas Survey

Enclosures





FEDERAL ENERGY ADMINISTRATION

WASHINGTON, D.C. 20461

SEP 27 1976

OFFICE OF THE ASSISTANT ADMINISTRATOR

Mr. S. L. Groff
Director and State Geologist
Montana Bureau of Mines and Geology
Montana College of Mineral Science
and Technology
Butte, Montana 59701

Dear Mr. Groff:

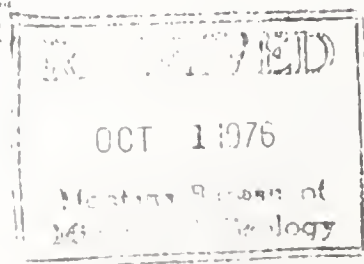
This is in response to your letter, dated August 6, 1976, asking for estimates of the future costs of energy.

I am enclosing a table which should help in preparing your report. It shows, for major fuel types, the average prices paid for each in 1974 and estimates of what these prices will be in 1980 and 1985. In addition, where data are available, the energy prices are shown by the various sectors of the economy. As you can see, the energy prices paid by users in one sector often vary considerably from that of users in another sector. This is particularly true if one compares the prices residential users pay compared to industrial users. The latter typically pay for energy at prices close to the wholesale level while the former pay at retail levels.

All of the prices shown are in 1975 constant dollars. The estimates for 1980 and 1985 therefore are in "real" terms, i.e., not adjusted for inflation. Since so much disagreement exists about what future inflation rates are likely to be, I think it would be best to leave this calculation to your own judgment.

The 1980 and 1985 estimates are based on computer simulations using the Federal Energy Administration's Project Independence Evaluation System (PIES). PIES forecasts energy prices and quantities for various years using different sets of assumptions. These are the assumptions used to arrive at the prices shown in the table:

- (1) price controls on oil are eliminated,
- (2) natural gas prices are deregulated



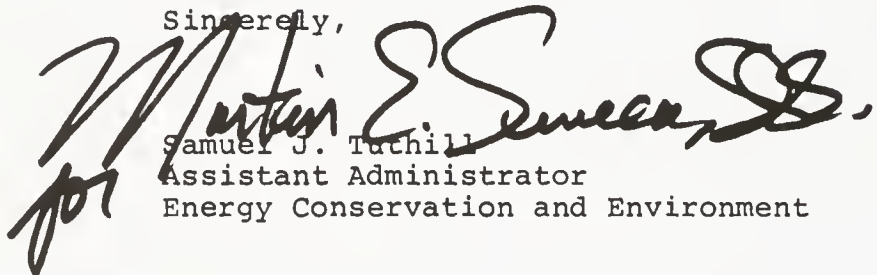
- (3) the price of imported oil is \$13 a barrel throughout these years, and
- (4) the impact on energy prices of conservation programs and policies mandated and/or authorized by the Congress are excluded. Estimates of these impacts are not available at this time.

It is important to emphasize that the prices shown in the table are not forecasts; they represent estimates of only one possible outcome, and this outcome is necessarily a function of the underlying assumptions. If different assumptions are made, the result might vary substantially.

Should you be interested, variations in these assumptions are depicted in the Federal Energy Administration (FEA) publication National Energy Outlook. This publication is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, under Stock Number 041-018-00097-6. Its price is \$7.30. In addition, for any follow-up discussions regarding price estimates you may want to talk to Dr. David Nissen who is FEA's Acting Director of the Office of Energy Systems Modeling and Forecasting. His telephone number is 202/961-8572.

I hope this information proves useful to you.

Sincerely,


Samuel J. Tatchell
Assistant Administrator
Energy Conservation and Environment

Enclosure

Estimated Average Energy Prices
(in 1975 constant dollars)

<u>Fuel Type</u>	<u>Actual 1974 Price</u>	<u>1980</u>	<u>1985</u>
Gasoline	\$ 0.580/gallon	\$ 0.631/gallon	\$ 0.604/gallon
Coal			
Industrial Sector	\$12.30/ton	\$14.09/ton	\$15.82/ton
Electricity			
Residential Sector	\$31.08/thousand kilowatt hours	\$32.42/thousand kilowatt hours	\$33.91/thousand kilowatt hours
Commercial Sector	33.74/thousand kilowatt hours	31.14/thousand kilowatt hours	32.63/thousand kilowatt hours
Industrial Sector	18.25/thousand kilowatt hours	23.03/thousand kilowatt hours	24.52/thousand kilowatt hours
Natural Gas			
Residential Sector	\$ 1.60/thousand cubic feet	\$ 2.59/thousand cubic feet	\$ 2.86/thousand cubic feet
Commercial Sector	1.30/thousand cubic feet	2.24/thousand cubic feet	2.51/thousand cubic feet
Industrial Sector	1.04/thousand cubic feet	1.76/thousand cubic feet	2.03/thousand cubic feet
Distillate Fuel			
Residential Sector	\$ 0.383/gallon	\$ 0.421/gallon	\$ 0.410/gallon
Commercial Sector	0.387/gallon	0.400/gallon	0.389/gallon
Industrial Sector	0.386/gallon	0.400/gallon	0.389/gallon
Residual Fuel			
Commercial Sector	\$ 0.413/gallon	\$ 0.348/gallon	\$0.379/gallon
Industrial Sector	0.413/gallon	0.348/gallon	0.379/gallon

FARMERS UNION CENTRAL EXCHANGE, INC.



Where the customer is the company

October 4, 1976

Montana Offices: Post Office Box 126
Laurel, Mont. 59044 • (406) 252-9326

Mr. S. L. Groff, Director
Montana Bureau of Mines and Geology
Butte, Montana 59701

Dear Mr. Groff:

In response to your inquiry with regard to our No. 9-31 Lima State well, Section 31, Township 14 South, Range 7 West, Beaverhead County, Montana, the following data should answer your questions:

Spud date: September 21, 1975
Completion date: March 17, 1976
Total depth: 15,722' (deepest hole in the State of Montana)
Status: Dry hole, plugged and abandoned
Cost: \$1,700,000

This hole was drilled with no major problems and so the time involved and the overall cost should probably not be considered typical for a deep hole in the Montana Overthrust Belt. Considering the geologic complexities and the enormous technical problems in drilling such a hole, it easily could have cost twice as much and accomplished much less in the way of evaluating the prospect.

I trust that you will find the above information helpful. If you require something more on this well, please feel free to contact us.

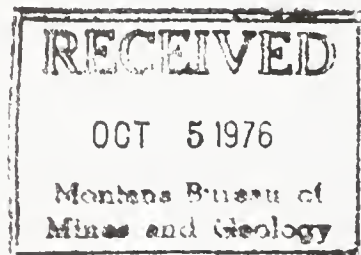
Yours very truly,

CENEX

A handwritten signature in cursive script, appearing to read "D. J. Kull".

D. J. Kull
Manager, Exploration & Production

DJK/vb



MONTANA TRADE COMMISSION

September 9, 1976

Sidney L. Groff, Director
Bureau of Mines and Geology
Montana College of Mineral
Science and Technology
End W. Park Street
Butte, Montana 59701

RECEIVED

SEP 13 1976

Montana Bureau of
Mines and Geology

Dear Sid:

In response to your request for information concerning product cost of Synthetic Natural Gas, I forward the following.

Gasification technologies are classified into two major groups relating to their stage of development. First generation technologies, typified by Lurgi and Koppers, are commercially proven low BTU gasification processes. The methanation step has also been utilized to some extent to increase the BTU content of the synthesis gas to +960 BTU/CF. In a recent study performed by C.F. Braun, Lurgi technology produced high BTU gas at \$3.32/MCF (Thousand Cubic Feet) equivalent well head price in 1976 dollars.

Congress is currently considering a Synthetic Fuels commercialization bill which would provide a 75% loan guarantee for commercialization of gasification processes. The only technology presently available for commercialization is either Lurgi or Koppers. This would facilitate the marketing of development bonds but would not decrease the cost of capitalization.

Second generation gasification technologies offer increased efficiency, and lower plant cost but have not commercially produced SNG. Pilot plants do exist and are producing synthetic gas which is indicative of the potential application of the technology. In a recent Bureau of Mines study and a Stanford Research Institute analysis, Synthetic Natural Gas cost in 1976 dollars was 2.27 and 3.38 respectively

Post Office Box 787 • Butte, Montana 59701 • Telephone Number: 406-723-3228

A DOMESTIC OFFICE OF THE MONTANA INTERNATIONAL TRADE COMMISSION

Page 2

for CO₂ Acceptor and 2.25 and 2.71 for the Hygas process. These prices were based on output from a 250 MMSCF/D commercial plant.

Significant capitalization options are offered for demonstration. If the decision is reached to accept a second generation technology for Montana application, we hope to be able to produce gas for approximately \$2.75/MCF in 1976 dollars.

Hopefully the above information is responsive to your request. If I can be of further assistance please do not hesitate to contact me.

Sincerely yours,



J. Andrew Kissner
Energy Projects Manager

JAK/dq



United States Department of the Interior

BUREAU OF RECLAMATION

Upper Missouri Region

P.O. Box 2553

Billings, Montana 59103

IN REPLY
REFER TO: 601

602.

AUG 17 1976

Mr. S. L. Groff
Director and State Geologist
Montana Bureau of Mines and Geology
Butte, Montana 59701

Dear Mr. ^{Sid} Groff:

The Bureau of Reclamation has initiated the Western Energy Expansion Study which will inventory and compare opportunities to increase availability of energy through water management and development. The present phase of the study is to identify potentials which can be further analyzed and priorities assigned to those which merit more detailed investigation and possible development. The study area covers the 17 Western States, including Montana; and although several potentials are located in Montana, it is too early to make any comments on the possible development of these potentials.

Since the Bureau's power and energy is developed from a hydro-resource, we are not directly involved with the supply of and costs associated with boiler fuels. However, for the past several years we have been involved in an oil conservation program with utilities that use oil for generation. This program involves utilizing excess hydrocapacity during heavy load periods to replace oil-fired generation and then replacing the hydroenergy during offpeak periods by purchasing lower cost coal- and nuclear-fired energy. In a dynamic program of this type there are many factors which can influence the average cost of both the replaced and purchased energy. However, in reviewing our records the average cost of purchasing energy during offpeak periods, from the larger and more efficient coal and nuclear-fired generating units has increased at least 30 percent since 1973. It should be noted that the manner in which this energy is purchased reflects only the fuel costs.

We agree that a general rising trend in energy cost can be expected, but we are unable to supply specific supportative data. One advantage of hydrogeneration is that operational costs are more stable since fuel escalation is not a factor.



Our construction activity in the last few years has been at a minimum. However, a comparison of costs for 345-kv transmission lines constructed in the eastern part of our system indicated that costs have more than doubled since 1968.

I hope that this summary of our activities and expectations will be of help in preparing your report.

Sincerely yours,

Robert L. McPhail

A handwritten signature in dark ink, appearing to read 'R. McPhail', with a large, stylized initial 'R'.

Regional Director



OFFICE OF
THE ADMINISTRATOR

In reply refer to: PCG

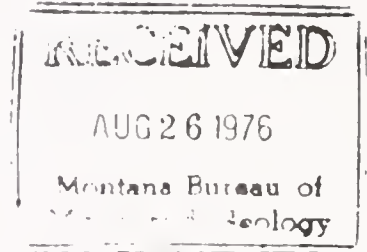
United States Department of the Interior

BONNEVILLE POWER ADMINISTRATION

P.O. Box 3621, PORTLAND, OREGON 97208

AUG 24 1976

Mr. S. L. Groff
Director and State Geologist
Montana Bureau of Mines and Geology
Montana College of Mineral
Science and Technology
Butte, Montana 59701



Dear Mr. Groff:

We are writing in response to your letter of August 6, 1976, wherein you request information pertinent to the "Energy-Supply Cost-Trend Report" which you are preparing for the 1977 Montana legislature. Our response covers current and future cost information as well as future supply considerations as they apply to electric power in the Pacific Northwest region, including Montana.

BPA's generation and sales statistics for calendar year 1975 (Enclosure 1) give detailed information on capacity and energy sales as well as the average price per kilowatthour paid by all of BPA's customers. For your convenience, we have separately identified energy sales data for the customers which we serve in Montana (Enclosure 2). We are also providing to you information on energy sales by the Montana cooperatives to each class of customer and the revenue from such sales, together with the average price charged to each such customer class for calendar year 1975 (Enclosure 3). Wholesale power costs to each of these utilities represent 23 to 33 percent of total revenues received from the final consumers.

As you recognize in your letter, it is difficult to establish energy prices for the future. At the present time, we expect that BPA's wholesale power revenues will have to be increased at least 40 percent in 1979 and by an additional 20 percent in 1981. Of course, these estimates are preliminary. They reflect current expectations of the additional costs associated with two new thermal power plants being constructed by the Washington Public Power Supply System (WPPSS) which become part of the Federal System's resources through net-billing. They also include known increases in costs for transmission construction and operation and maintenance of the Federal transmission system. Additional increases in any of these or other costs that occur between now and the time of those proposed rate filings would further increase our revenue requirements and, thereby, our future rate levels.

Ltr. to S. L. Groff, Butte, Montana, Subj: Electric Energy Costs and Supply

After fiscal year 1981, future BPA rate increases under the current program for regional resource development will primarily reflect general inflation because BPA will have few new energy resources for which it must recover costs. If you are seeking specific estimates of future costs for nuclear generated power, we suggest that you contact the Washington Public Power Supply System, 3000 George Washington Way, P.O. Box 968, Richland, Washington 99352. As mentioned above, WPPSS is in the process of planning and constructing several nuclear plants and should be able to provide you with such data. Estimated future costs and availability of coal-fired electric energy would best come from those public or private utilities which now operate or plan to operate this type of plant. (Pacific Power & Light and the Montana Power Company are Northwest utilities involved in such plants.)

In your letter, you state that: "Our only chance to avoid an accelerating rate increase is to utilize even more hydro power and our own resources of coal and uranium." Unfortunately, potential future additions of low cost hydroelectric energy are extremely limited in the Pacific Northwest. Such additions cannot keep pace with anticipated load growth. Moreover, current costs of new thermal resources are considerably greater than costs of hydro resources, and indications are that future thermal resources will cost even more than current ones. As a consequence, the addition of all such resources which are essential to meet load growth will exert considerable upward pressure on future rate levels. In short, continued load growth will result in continued rate increases for the foreseeable future.

As a result of the limited potential for new hydroelectric energy, and the fact that present plans do not provide for additional acquisition of thermal power, BPA has recently notified its preference utility customers that it will no longer be able to meet the energy requirements of such customers after June 30, 1983. From that time, BPA will provide allocations of energy to each of its preference customers. To the extent that such allocations are not sufficient to meet these customers' energy needs, they will have to arrange for their own resources to do so.

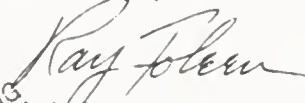
BPA is currently involved in developing an extensive environmental impact statement analyzing its role in developing future regional electric power resources. This "Role EIS" will include discussions of many alternatives regarding future energy supply and demand as well as pricing considerations. We will be happy to make a copy of the draft statement available to you when it is completed. We expect to make public distribution of this document in January 1977. Another source of information which may be useful to you is a series of energy

Ltr. to S. L. Groff, Butte, Montana, Subj: Electric Energy Costs and Supply

studies funded by the Pacific Northwest Regional Commission, under the direction of the Northwest Energy Policy Project (NEPP). NEPP is directing several energy study topic areas including supply, demand, and conservation for the states of Oregon, Washington, and Idaho. Although these studies do not relate directly to Montana, a significant amount of useful information should come from them which could be applicable to your report. For further information regarding this study, we suggest you contact Myron Katz, Director, Northwest Energy Policy Project, 1096 Lloyd Building, 700 NE Multnomah Street, Portland, Oregon 97232.

We hope that the information that we have provided is of some use to you in the preparation of the report for the Montana legislature. We would be happy to respond to any specific questions which your initial inquiries may have raised.

Sincerely yours,


ACTING Administrator

3 Enclosures:
BPA Generation and Sales
Statistics, CY 1975
BPA Energy Sales by Customer
in Montana, CY 1973-75
Montana Cooperatives Sales
and Revenues, CY 1975

NORMALIZED FUEL AND PLANT COST

<u>FUEL TYPE</u>	<u>FUEL COST</u>	<u>COST PER KWH</u>
Natural Gas	10¢ per million btu \$1.00	1 mill per kwh 1¢ per kwh
Oil	\$1.00 per barrel i.e. \$12.00 per barrel	2 mills per kwh 2.4¢ per kwh
Coal	\$1.00 per ton \$10.00 per ton \$20.00 per ton \$35.00 per ton	.4 mill per kwh 4 mills per kwh 9 mills per kwh 1.5¢ per kwh
Nuclear	\$8.00 lb uranium \$16.00 lb uranium \$25.00 lb uranium	2 mills per kwh. (includes processing & enrichment) 2.7 mills per kwh 3.2 mills per kwh

CAPACITY COST

\$50.00 per kw	1 mill per kwh
\$100.00 per kw	2 mills per kwh
\$500.00 per kw	1¢ per kwh

Units of Measure

Weight

1 metric ton	<i>contains</i>	1.102 short tons
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Conversion Factors for Crude Oil

Average gravity

1 barrel (42 gallons)	<i>weighs</i>	0.136 metric tons (0.150 short tons)
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1 metric ton	<i>contains</i>	7.33 barrels
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1 short ton	<i>contains</i>	6.65 barrels
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Conversion Factors for Uranium

1 short ton (U_3O_8)	<i>contains</i>	0.769 metric tons of uranium
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1 short ton (UF_6)	<i>contains</i>	0.613 metric tons of uranium
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1 metric ton (UF_6)	<i>contains</i>	0.676 metric tons of uranium
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Approximate Heat Content of Various Fuels

Petroleum

Crude Oil	5.800 million Btu/barrel
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Refined products

Imports, average	6.000 million Btu/barrel
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Consumption, average	5.517 million Btu/barrel
----------------------	--------------------------

Gasoline	5.248 million Btu/barrel
----------	--------------------------

Jet Fuel, average	5.592 million Btu/barrel
-------------------	--------------------------

Naphtha-type	5.355 million Btu/barrel
--------------	--------------------------

Kerosine-type	5.670 million Btu/barrel
---------------	--------------------------

Distillate fuel oil	5.825 million Btu/barrel
---------------------	--------------------------

Residual fuel oil	6.287 million Btu/barrel
-------------------	--------------------------

Natural gas liquids	4.031 million Btu/barrel
---------------------	--------------------------

Natural gas

Wet	1,093 Btu/cubic foot
-----	----------------------

Dry	1,021 Btu/cubic foot
-----	----------------------

Coal

Bituminous and lignite

Production	24.01 million Btu/short ton
------------	-----------------------------

Consumption	23.65 million Btu/short ton
-------------	-----------------------------

Anthracite	25.40 million Btu/short ton
------------	-----------------------------

Electricity Conversion Heat Rates

Fossil fuel steam-electric

Coal	10,176 Btu/kilowatt hour
------	--------------------------

Gas	10,733 Btu/kilowatt hour
-----	--------------------------

Oil	10,826 Btu/kilowatt hour
-----	--------------------------

Nuclear steam-electric	10,660 Btu/kilowatt hour
------------------------	--------------------------

Hydroelectric	10,389 Btu/kilowatt hour
---------------	--------------------------

Electricity Consumption	3,412 Btu/kilowatt hour
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THE MONTANA POWER COMPANY

GENERAL OFFICES: 40 EAST BROADWAY, BUTTE, MONTANA 59701 • TELEPHONE 406 / 123 5421

ROGER A. HOFACKER
VICE PRESIDENT—ENGINEERING

October 1, 1976

Dr. S. L. Groff, Director
Montana Bureau of Mines & Geology
West Park
Butte, MT 59701

Dear Dr. Groff:

Mr. McElwain has requested that I forward to you the attached memorandums concerning the present and future gas and electric resources. They are prepared in response to your request to him of July 26.

Hopefully they will prove useful in your efforts to provide information for the coming legislature.

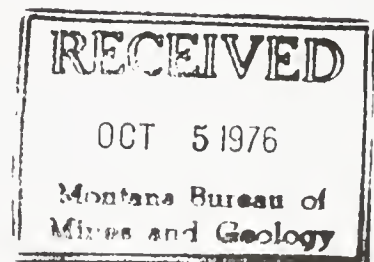
Sincerely yours,

Roger A. Hofacker

RH/ln

Attachments

cc: J. A. McElwain
R. A. Billings



MEMORANDUM

TO : Joe McElwain
FROM: R. A. Hofacker
RE : Electrical Energy Supply and Cost Trend Report
as Part of the Information for Sid Groff

This applies only to Montana Power Company's service area.

1. Present Sources - Montana Power Company's present electric energy resources (exclusive of Colstrip Units #3 and #4) are made up of approximately 48% hydro-generation and 52% coal fired steam generation. This amounts to about 800 average megawatts after maintenance and availability of plants is considered. Our energy load for the 1976-77 operating year is expected to be about 670 average megawatts.
2. Adequacy for the Future - Facing a growing electrical energy load, our present resources, without Colstrip Units #3 and #4, are adequate until the 1979-80 operating year if the water supply is low ("critical"). Normal ("median") water would extend this capability one year.

We have received the State Permit for construction of Colstrip Units #3 and #4 and are currently working with EPA on clearances under their regulations. Our target commercial dates for these units are October 1980 and August 1981. With our share of these units, our current load forecast indicates we will probably not require additional resources until 1986 or 1987.

Significant increases in industrial type loads (we currently have several inquiries totaling several hundred megawatts, i.e., pumping for Northern Tier Pipeline, Hoerner Waldorf, Stauffer Chemical, etc.) could reduce this period of adequate resources considerably.

Basically the reasons for load growth are the slow but finite growth in population and a gradual increase in consumption by each customer. We are all aware of these trends.

Several other factors now indicate the need for more electricity, such as:

- (a) Pollution control and environmental cleanup require substantial electric energy.
- (b) Large amounts of irrigation pumping are necessary to more efficiently use our limited water resources.

September 30, 1976

(c) While Montana Power Company sells power to certain Rural Electric Cooperatives within its service area, it also wheels Bureau of Reclamation and BPA power to great many more. Both of these federal agencies have indicated they cannot supply wholesale electricity for the growth of these co-ops. For the co-ops served by the Bureau, this occurs in 1977, for BPA co-ops, 1983.

(d) There is a clear trend toward increased electric space heating due to the rise in fuel oil and gas prices. Electricity is the only source of heat energy matching oil and gas in convenience.

3. Future Resources - Our load forecasts indicate a firm energy load of 887 average megawatts in 1981-82; 1,194 in 1987-88; 1,457 in 1991-92 and 1,783 in 1995-96. Over 2½ times our present energy capability will be required by that time (or twice the total plant capability existing after Colstrip #3 and #4 are completed).

New plant additions on our system are likely to be coal fired steam or hydroelectric.

4. Cost Trends - Naturally the cost of electrical energy will be forced up by general inflation forces. However, it enjoys a stability that is not characteristic of oil for instance. Approximately 60% of the cost of production from the steam plant is made up of fixed costs related to financing the investment. Therefore, once built, the greater part of the total energy cost is not subject to inflation. In addition, the investment in plants already built will provide some inertia to resist the increases brought about by future plant construction at higher costs, under the conventional concepts used to price electricity.

How much higher will these costs be? If we assume a steady 7% per year escalation, construction costs will have quadrupled by 1996. Suppose we install the generation capability to meet our load forecast suggested above. The 1995 plant addition will cost four times as much as today's plants. Total electric plant investment based on this projection would be over six times its present value but this will have increased the average cost per kilowatt of all generating facilities then in use only 2½ times. Therefore, the cost of electric energy due to fixed costs will only slightly more than double over the next 20 years. This is equivalent to an escalation rate of about 5% per year.

September 30, 1976

The smaller part of the cost of production from the steam plant is made up of Operation and Maintenance expense and fuel. O & M will probably escalate with prices generally.

Fuel costs will be relatively stable, due to the proximity to economically strippable coal. Labor and supplies for mining of course will increase in cost according to the prevailing influences.

It can be concluded that the cost of electric energy over the next two decades will be subject only to a reasonable escalation rate. Compared with other goods and services its price will probably increase the least. Due to the fact that there will never be a shortage of the fuel component, it should remain the standard of value for Montana energy users for many years.

¹ Hydro is desirable but the remaining practical sites in Montana or anywhere else are few and far between. The two sites which we have strongly supported are Buffalo Rapids 2 and 4 in Montana and High Mountain Sheep on the Snake River. There is yet the possibility that with proper agreement with the Confederated Salish and Kootenai Indians, the Buffalo Rapids Project may be developed. It would produce 120 megawatts average, slightly over a third of our share of the output of Colstrip #1 and #2.

Nuclear plants even with their low cost fuel are not economic in comparison with Montana coal fired plants at present; because we are, so to speak, sitting on the coal pile. Since long distance transportation of coal generally is a big portion of the cost of coal fired steam plant production, nuclear is a good competitor to coal anywhere but in this and closely neighboring states.

MHD may come into its own eventually with perhaps success of the test plants by 1985; but because of the seven to eight year lead time required to build any generation, MHD could hardly fit into the picture except possibly as the 1995 increment of the generation plan suggested above.

September 30, 1976, DD/cay/5:1

October 4, 1976

To: J. A. McElwain

From: R. L. Billings

Re: SUPPLY OF NATURAL GAS AND COST TRENDS AS PART OF INFORMATION
FOR MR. GROFF

1. Present sources of gas. We currently can import 34.2 Bcf per year from Canada; without favorable action by the Canadian National Energy Board this will drop to 29.2 Bcf per year beginning next May. MPC will apply to the Board to continue exports at the 34.2 Bcf level-given the current short term surplus of gas in Alberta the Board may grant our request; then again maybe not. The balance of our gas supply comes from Montana. Our estimated gas requirements for 1977 (normal weather) are about 52 Bcf. The quantities of gas delivered to customers is somewhat lower because requirements include gas used in the operation of our transmission and distribution systems.

2. Adequacy for the future. Our gas supplies from Canada, assuming we take the full 29.2 Bcf each year, will continue at the 29.2 rate thru 1985 and drop to zero at the end of 1987. At that time we would have imported all of the gas licensed for export by the Canadian government. Montana production also needs to be continually replaced; assuming our exploration, development and gas purchase programs continue to replace produced reserves as they have in the past, I anticipate no curtailments due to supply until 1983. There is reason, however, to doubt that MPC can continue these programs given the present attitude of the Public Service Commission. Nevertheless, if we can continue the programs and if they are as successful as in the past, MPC's customers will have no problems until 1983. From 1983 thru 1985 curtailments of industrial customers should total from 1 to 3 Bcf per year. After 1985 MPC needs to have substantial reserves on hand to replace the expiring Canadian licenses. By substantial I mean something on the order of 450 Bcf. It is obvious that MPC cannot plan to buy these at the time they are needed (1985), but must acquire these reserves between now and 1985.

3. Future sources and reserves. MPC is seeking to find and purchase reserves in Montana and other states so that its customers will have adequate supplies when Canadian licenses expire. I believe that a much more favorable state economic climate for exploration is required before Montana will attract the large capital requirements necessary for deep gas exploration. MPC also is backing the Arctic Gas Pipeline project and has acquired the rights to purchase some of this gas, should the line come to Montana as planned for 1982. If the line is approved, and it may not be, the amounts of gas under these rights are not at present large enough to offset the amounts lost under the expiring Canadian licenses. Coal gasification is also being considered by the Governor's task-force as a possible source of future supply.

4. Cost trends. The cost trend is up. I suspect that increases in the price of natural gas will be less in the future than they have been in the recent past. The price of oil energy is about \$2 per MMBTU; the Canadian price (\$1.94, 1/1/77) and the new gas price being offered by MPC (\$1.75) approach this the oil equivalent. International oil prices are set by the OPEC cartel, however, and they will move their prices up to keep up with inflation. These increases will be reflected in the international border prices for gas set by the Canadian government, and will, of course, affect the Montana producer price. Cost trends for the residential consumers will go up if industrial customers will convert to coal and other fuels. At present about 40% of MPC's gas is consumed by industrial customers who pay for their share of gathering and transmission costs, which are mostly of a fixed nature. As industrial customers drop off, these fixed costs must be borne by the remaining customers, creating an unpleasant rise in individual costs, even though other factors, such as price and volume, do not change. MPC has not connected any new industrial customers for over three years so that its gas supplies can be devoted to its present customers and new residential customers. Should Arctic gas supplies, or gas from coal become available, I would expect them to be priced higher than present sources.

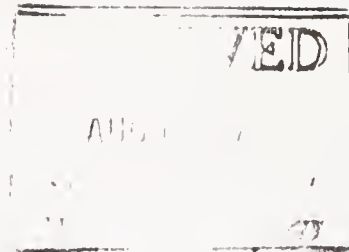
If all of this sounds too gloomy, I hasten to add that we have time to replace our reserves and time to pursue policies that are in the long term interests of our customers and the State. Our gas supplies are sufficient for the next seven to ten years. With the proper economic and regulatory climate natural gas will serve Montanans for many years in the future.



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MONTANA DAKOTA UTILITIES CO.

400 NORTH FOURTH STREET - BISMARCK, ND 58501 - TEL (701)224 3000



August 16, 1976

Mr. S. L. Groff
Director and State Geologist
Montana Bureau of Mines and Geology
Montana College of Mineral Science and Technology
Butte, MT 59701

Dear Mr. Groff:

I am responding to your letter dated August 6 asking for my opinion about the energy situation as it applies to Montana-Dakota Utilities Co.

I believe that nationwide we can look for much higher retail natural gas rates and declining supplies. I doubt if the recent drastic raise in field prices will do more than slow down the decline in gas supplies. Certainly the raise in field prices will help the supply situation. With its dependence on Canadian gas, the state of Montana will have a tougher time than the rest of the country.

I expect that MDU will have serious gas supply problems and will probably have to cut back drastically in its industrial sales. This latter action will cause rises in domestic rates. Eventually, probably MDU will have to share in the output of a coal gasification plant if it is to continue in the gas business. With a good regulatory climate, this probably would be a feasible scheme. In a poor regulatory climate, it probably would be impossible to finance MDU's share of such a plant.

The liquid fuel situation in Montana is not much better than the gas supply situation. Again, the state is heavily dependent on crude supplies from Canada and the Canadian government has threatened to cut off all or part of this supply. In any case, the state is faced with the same problem as the nation in that an increasing reliance on foreign crude puts potentially intolerable strains on our ability to carry on. I can see nothing but higher and higher prices and increasing dependence on foreign nations -- not all of whom are friendly to the United States.

The uranium supply picture, assuming that we carry out a vigorous breeder reactor program, is not as grim as the gas and oil supply picture. We have large supplies in the country. If the people who wish us not to use our uranium supplies in power

Mr. S. L. Groff
Page 2
August 16, 1976

plants prevail, then our uranium supplies will not help the fuel situation at all. I believe the voters will favor the use of nuclear plants when they know the facts. Assuming that, I believe we can foresee some rises in uranium costs. Since nuclear plants are not sensitive to rises in fuel costs, this will not be too bad a situation.

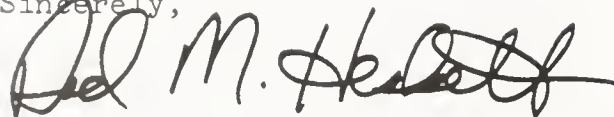
If we are to maintain our present standard of living or to better it, we must depend heavily on coal burning power plants for many years to come. We have large coal supplies in the country, especially in the West. Because of the large supply of coal, I do not expect drastic rises in coal prices. Given a chance to do so by the legislatures, I expect to see coal filling some of the gaps created by shortages of oil and gas by means of liquefaction and gasification plants.

My opinion is that the country is at a cross-roads as far as energy is concerned. If the legislatures so decide, we will continue to hurt the energy companies by taxes and punitive legislation, we will make it difficult or impossible to meet our energy needs and we will condemn our children and their children to chronic energy shortages and a much lower standard of living.

On the other hand, if the legislatures see fit to do so, we have the capability to overcome our energy problems and make it possible for our descendants to achieve a much fuller life. The decision is ours as a nation to make.

If you wish to use all or part of my comments in your report, you have my permission.

Sincerely,

A handwritten signature in dark ink, appearing to read "David M. Heskett", with a stylized, cursive script.

David M. Heskett
President

DMH:dsa

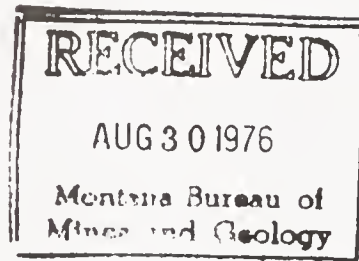
NRECA

2000 FLORIDA AVENUE, N.W., WASHINGTON, D.C.

20009 • TELEPHONE 202 • 265 7400

August 25, 1976

Mr. S. L. Groff, Director
and State Geologist
Montana Bureau of Mines and Geology
Montana College of Mineral Science
and Technology
Butte, Montana 59701



Dear Mr. Groff:

This is in response to your letter of August 6, 1976, regarding the cost of energy to rural consumers in the state of Montana. We will deal primarily with the cost of electric power to rural electric cooperatives in Montana. The attached table which comes from the annual statistical report--rural electric borrowers for the years 1971 through 1975 as reported by REA, summarizes the cost of wholesale electricity purchased by rural electric cooperatives in Montana. You will note that these costs range from .51¢ to .66¢ per kwh between 1971 and 1975--an increase of 29.41%. The average revenues received by Montana cooperatives during this same period range from 1.80¢ to 1.98¢ per kwh--an increase of 10%. Let me hasten to point out that almost all of the wholesale electricity furnished to Montana cooperatives is presently purchased by them at low cost from the Montana Power Co., Bureau of Reclamation, The Bonneville Power Administration, and Basin Electric Power Cooperative.

As you no doubt know, the Bureau of Reclamation has already notified its Missouri Basin customers of its inability to continue furnishing enough power to meet their total requirements. We understand that the Bonneville Power Administration has also notified its rural electric wholesale customers that it will not be able to meet their full power requirements after the early 1980s. This simply means that the Montana cooperatives will at some point in the near future be faced with a dramatic increase in power cost. The enclosed booklet which was issued in 1975 by NRECA illustrates the sharp increases which have taken place between 1970 and 1975 in fuel costs and the capital cost of both nuclear and coal fired generating stations. It also contains information on the price of poles and guy wires. As you say, all of us are aware of the impact of OPEC oil prices on the nation's energy prices. I note that you have requested information from the Federal Power Commission which agency has just approved a rate increase from the old ceiling of 52¢ to \$1.42 per million cubic feet for new gas in interstate commerce.

Mr. S. L. Groff
August 25, 1976
Page Two.

It is our understanding that the construction costs of power plants are still increasing at a rate approaching 20% a year. In order to give you a rule of thumb means of estimating the cost of power in mills per kwh at the generator based primarily on fuel and construction costs, I am attaching a tabulation of normalized fuel and plant costs which was prepared last year by Morgan Dubrow, our Staff Engineer and Don Smith, our Staff Economist. The conversion units used in the computations of the fuel costs in mills and cents per kwh are attached, i.e., the relationship between the barrels of oil and millions of BTU's and the BTU's in a cubic foot of gas, and the short ton of coal and finally the electric conversion heat rates in BTU's per kwh.

What this simply means is that these values will give you a normalized plant unit cost per kwh for all four types of fuel and for the plant investment. For example, for a coal fired plant costing \$500 per kw, according to the attached table the capacity cost amounts to 1¢ per kwh. An additional cost of .9¢ per kwh would be incurred to pay for coal costing \$20 per ton. Therefore, one total generating cost under this example would be 1.9¢ per kwh. Of course, there would be other expenses involved which would further increase the wholesale power cost to the distribution electric cooperative.

You will recall that the cooperatives are presently paying about 2/3¢ for power which they must sell for 2¢ a kwh to cover transmission, distribution, operation and maintenance, etc. On this basis, you can see that as new high cost steam plants come into services, the cost of power will increase dramatically. Although at the present time, the rate of inflation has lessened, power costs are continuing to escalate rapidly as new high costs units are added to power systems. Some of our Missouri Basin G&T's are anticipating power costs as high as 2-½/kw at the plant and 5¢ per kwh delivered to customers in the early 1980s. For a comparative analysis, the attached chart of Monthly Residential Electric Bills indicate the power cost in selected cities throughout the United States, a range of 2¢ to 6.7¢ per kwh.

In the final analysis, it would appear to us that power costs will continue to increase as fuel costs and construction costs rise. The only long range hope for lower cost power that we presently foresee

Mr. S. L. Groff
August 25, 1976
Page Three.

is the development and commercial use of the Liquid Metal Fast Breeder Reactor which will minimize the cost of fuel.

I hope this information proves helpful to you.

Sincerely,

A handwritten signature in cursive script that reads "Charlie Robinson".

Charles A. Robinson, Jr.
Deputy General Manager

CAR/apu
Attachments.

MONTANA RURAL ELECTRIC COOPERATIVES

Year	KWH SALES (000)	REVENUE	REVENUE/KWH ¢ PER KWH	PER CENT CHANGE FROM PRIOR YEA
1971	785,318	14,125,672	1.80	
1972	848,966	15,065,405	1.77	-1.67
1973	885,661	15,830,006	1.79	.1.13
1974	925,782	17,433,346	1.88	5.03
1975	1,003,987	19,830,920	1.98	5.32

SOURCE: Annual Statistical Report - Rural Electric Borrowers; 1971, 1972, 1973, 1974, 1975; REA

YEAR	COST OF PURCHASED POWER	COST/KWH (CENTS)	Per CENT CHANGE FROM PRIOR YEAR
1971	\$4,032,737	.51¢	
1972	4,337,559	.51¢	--0--
1973	4,608,739	.52¢	1.96%
1974	5,068,919	.55¢	5.77%
1975	6,208,954	.66¢	12.73%

MONTHLY RESIDENTIAL ELECTRIC BILLS

1,000 Kilowatt-hours

January 1976

New York	\$67
Boston	\$43
Los Angeles	\$39
Detroit	\$35
St. Louis	\$35
Miami, FL.	\$34
Wash., D.C.	\$34
Asheville	\$33
Little Rock	\$31
Atlanta	\$30
Chicago	\$29
Birmingham	\$28
Louisville	\$27
TVA R-2	\$23
Portland, OR.	\$20

NOTE: Bills for others are based on residential rate information obtained directly from the utilities. Bills include all currently applicable adjustments and charges except local and state sales taxes. TVA rate level R-2 is typical of basic residential bills in TVA service area; amount may vary in particular locations due to rate level difference and application of special charges.

FLATHEAD Electric COOPERATIVE, Inc.

POWER AND LIGHT

510 LaSALLE ROAD

KALISPELL, MONTANA 59901

PHONE 755-5483

OWNED AND OPERATED BY THOSE WE SERVE

August 26, 1976

Mr. S. L. Groff, Director
and State Geologist
Montana Bureau of Mines and Geology
Montana College of Mineral Science and Technology
Butte, Montana 59701

Dear Mr. Groff;

Reference is made to your letter to Mr. Charles Robinson, copy of which we received for the purpose of giving you some comment on energy supply, costs, etc.

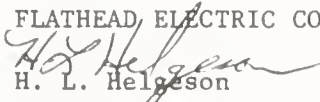
During the past 10 years our sale of electricity has been increasing at the average rate of 10% and it appears that it will increase at a larger percentage in coming years due to electric energy useage replacing other sources of energy.

Up to the present time, we have experienced no energy shortage because of our useage, however we know that our future adequate supply is dependent upon the development of additional supplies of electric power or energy from nuclear, hydro or other fuel sources. Unless additional supplies are developed, we will be compelled to share shortages at least throughout the northwest region.

We are experiencing increases in the cost of energy we are buying and our other costs of providing service are increasing substantially every year. When we consider these cost increases, it appears that our retail rates will have to increase annually unless something occurs that halts the increasing cost of wholesale power and the present inflationary trend of all costs.

Very truly yours,

FLATHEAD ELECTRIC COOP., INC.


H. L. Helgeson
Manager

RECEIVED

SEP 1 1976

Montana Bureau of
Mines and Geology

